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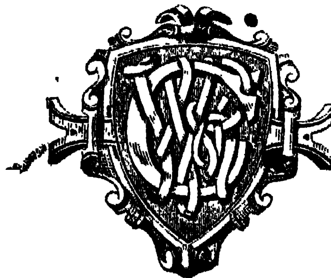
A DICTIONARY

OF UNIVERSAL KNOWLEDGE FOR THE PEOPLE

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WITH MAPS AND NUMEROUS WOOD ENGRAVINGS

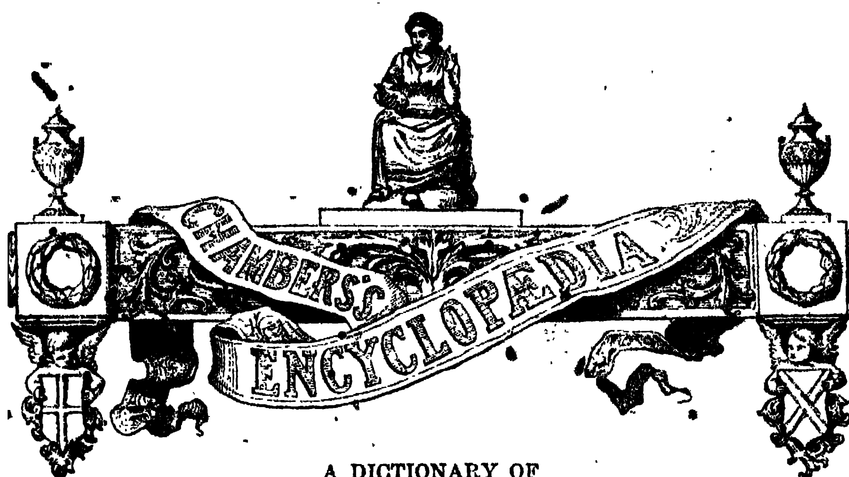
VOL. VIII



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PUE'RTO BE'LLO, a small decayed seaport town of the United States of Colombia, on the northern shore of the Isthmus of Panama, and 40 miles north of the town of that name. It is surrounded by mountains, has an excellent harbour, is very unhealthy, and has fallen into decay since the year 1739, when it was stormed by Admiral Vernon, during the war between England and Spain.

PUE'RTO DE SA'NTA MARI'A (usually called El Puerto, the Port), a seaport of Spain, in the modern province of Cadiz, stands at the mouth of the Guadalete, in a most fertile district, on the Bay of Cadiz, 6 miles north-east of the city of that name, and 9 miles by railway south-west of Xeres. Suspension-bridges cross the Guadalete and the Rio de S. Pedro. The mouth of the Guadalete forms the harbour; but the bar is dangerous and much neglected. P., a pleasant and well-built town, resembling Cadiz in its houses, and containing only one long and handsome street, while the others are narrow and ill paved, is the port for the shipment of Xeres wines. The wines are lodged in numerous *bodegas*, or wine-stores, lofty buildings built with thick walls and narrow windows, in order to secure an even temperature inside. From this port about 1,530,000 gallons of Xeres wines are exported to foreign lands, and about 26,000 gallons are transported inland. The bull-fights which take place here in May are among the most famous in the country. Steamers ply three times a day between this town and Cadiz, and P. supplies that city with drinking-water at a cost of £10,000 a year. Pop. about 18,000.

PUE'RTO PRI'NCIPÉ, Santa Maria de, an important inland town in the east of the island of Cuba, about 325 miles east-south-east of Havana, and 45 miles south-west of its port, Las Nuevitas, with which it is connected by railway. Pop. 30,000.

PUERTO RI'CO, an island in the West Indies, belonging to Spain, is one of the Greater Antilles, and lies west of Hayti or St Domingo, lat. 17° 55'—18° 30' N., long. 65° 39'—67° 11' W. It is in size somewhat less than Jamaica, being fully 100 miles from east to west, 40 miles from north to south, and closely resembling a rectangle in shape. Area, 3897 square miles: pop. in 1860, 583,308, of whom 300,430 were pure whites, and 282,878 coloured. Of the latter, 241,142 were free, and the remaining 41,736 were slaves. The island is traversed from east to west by a range of mountains, 1500 feet in average height, though rising in one peak to 3678 feet above the sea. From the base of the mountains, rich alluvial tracts extend to the sea, and there are numerous well-wooded and abundantly watered valleys. The climate is warm, but is considered more healthy than that of any other island of the West Indies. The soil is remarkably fertile. The principal crops are sugar, coffee, and tobacco of the finest quality, and cotton remarkable for its length of fibre, tenacity, and whiteness. Cattle and sheep are extensively reared, of a quality superior to any others in the West Indies. There were in the island, in 1862, 553 sugar-estates, 335 distilleries, 57 cattle-estates, 54 tobacco, and 53 coffee-plantations, and 10 tanneries, besides numerous small farms and *estancias*. The value of the imports for the year 1863 was £1,839,821, of which £775,987 was from Great Britain and her colonies; and the value of the exports was £1,178,729, of which £510,199 was for Great Britain and her colonies. The imports consist of cotton, woollen, linen, silk, and embroidered goods, metals, hardware, and provisions, as ale, porter, fruits, wines, &c. The exports are sugar, tobacco, coffee, cotton, molasses, rum, hides, and cattle. The chief ports are San Juan, commonly called Puerto Rico (pop. stated at 10,000), in the north-east, Ponce in the south-west, and Mayaguez in the west. In 1863, 966 British and foreign vessels, of 196,912 tons, entered and cleared the port of San Juan or Puerto Rico. At the close of the same year, surveys had been completed for a railway running along the north coast

from San Juan to Arecibo, a distance of about 50 miles; while another railway along the south coast was about to be commenced. Owing to the great demand for cotton, consequent upon the American war, the cultivators have turned their attention to rearing that crop; and in 1863, four times the quantity grown in the previous year was produced.

PUFF-ADDER (*Clotho arietans*), a serpent of the family *Viperidæ*, having a short and broad flat head, with scales so sharply keeled as to end in a kind of spine. It is one of the most venomous and dangerous serpents of South Africa. It attains a length of four or almost five feet, and is thick in proportion to its length, often as thick as a man's arm. Its head is very broad; its tail suddenly tapered; its colour brown, chequered with dark brown and white; a reddish band between the eyes; the under parts paler than the upper. Its movements are generally slow, but it turns very quickly if approached from behind. It usually creeps partially immersed in the sand of the South African deserts, its head alone being completely raised above ground. When irritated, it puffs out the upper part of its body, whence its name. The P. is easily killed by the oil, or even by the juice of tobacco. Its poison is used by the Bosjesmans for their arrows.—South Africa produces several other species of *Clotho*, similar in their habits to the P., and almost equally dangerous.



Puff-adder (*Clotho arietans*).

PUFFBALL (*Lycoperdon*), a Linnæan genus of *Fungi*, now divided into many genera, belonging to the section *Gasteromycetes*, and to the tribe *Trichospermi*. They mostly grow on the ground, and are roundish, generally without a stem, at first firm and fleshy, but afterwards powdery within; the powder consisting of the spores, among which are many fine filaments, loosely filling the interior of the *peridium*, or external membrane. The peridium finally bursts at the top, to allow the escape of the spores, which issue from it as very fine dust. Some of the species are common everywhere. Most of them affect rather dry soils, and some are found only in heaths and sandy soils. The most common British species is *L. gemmatum*, generally from one to two and a half inches in diameter, with a warty and mealy surface. The largest British species, the GIANT P. (*L. giganteum*), is often many feet in circumference, and filled with a loathsome pulpy mass, when young; but in its mature state, its contents are so dry and spongy that they have often been used for stanching wounds. Their fumes, when burned, have not only the power of stupifying bees, for which they are sometimes used, in order to the removal of the honey, but have been used as an anæsthetic instead of chloroform. The same properties belong also to other species. Some of them, in a young state, are used in some countries as food, and none of them is known to be poisonous.

PUFF-BIRD. See BARBET.

PUFFENDORF, SAMUEL, son of a Lutheran clergyman, was born in 1632 at Chemnitz, in Saxony. He received the early part of his education at Grimma; whence he removed to the university of Leipzig. There he studied theology for several years. In 1656 he went to the university of Jena, where he seems to have devoted himself at first chiefly to mathematics, and subsequently to the study of the *Law of Nature*, as he, and others who have treated on the same subject, have termed the law which regulates the duties of men to one another, independent of the mutual obligation which is enforced by political government, or by revelation of divine will. After quitting Jena, he was appointed tutor to the son of the Swedish ambassador at Copenhagen. Soon after he had received this appointment, a rupture having taken place between Denmark and Sweden, P. was detained as a prisoner in the Danish capital. The power of his mind here shewed itself in a remarkable manner. Deprived of books and of society, he threw himself vigorously into meditating on what he had formerly read in the treatise of Grotius, *De Jure Belli et Pacis*, and in the writings of Hobbes on the principles of general law. The result was the production of the *Elementa Jurisprudentiæ Universalis*—a work which was the foundation of its author's fortune. It was dedicated to the Elector Palatine; and by this prince, P. was appointed to the Professorship of the Law of Nature and Nations at the university of Heidelberg. He now gave his attention to the tissue of absurdities which existed in the constitution of the Germanic Empire. As was to have been expected, the work (*De Statu Reipublicae Germanicae*, 1667), in which he exposed the defects of the system, raised a storm of controversy. Austria was especially furious. P. had taken care to publish it under a pseudonym—that of Severinus a Mozambano, but still, to avoid the possible consequences, he accepted an invitation from Charles XI. of Sweden, in 1670, to become Professor of the Law of Nations at Lund. During his residence there, he published the work on which his fame now principally rests, *De Jure Naturæ et Gentium*. He then removed to Stockholm, where the king of Sweden made him his historiographer, with the dignity of a counsellor of state. In his official character, he published a very uninteresting history of Sweden, from the expedition of Gustavus Adolphus into Germany to the death of Queen Christina. In 1688, the Elector of Brandenburg invited him to Berlin to write the history of his life and reign. P. accepted the invitation, and executed the required work in 19 dreary volumes. His intention was to have returned to Stockholm, but death overtook him at Berlin in 1694. P. lacked the genius to render the subjects on which he wrote generally interesting, but his intellectual power was nevertheless very considerable, and it appears to have throughout been honestly exercised and with unflagging industry.—See Jenisch's *Vita Pufendorfii* in the *Memoirs of the Academy of Stockholm*, 1802.

PUFFIN (*Fratercula*), a genus of birds of the Auk (q. v.) family, *Alcadæ*, having the bill shorter than the head, very much compressed, its height at the base equal to its length, the ridge of the upper mandible as high as the top of the head, both mandibles arched, and transversely grooved. The

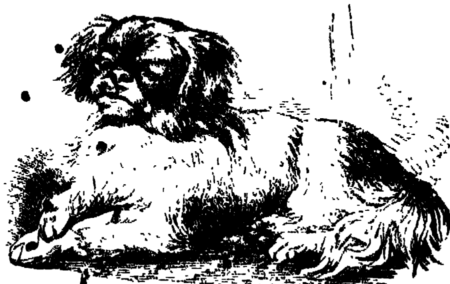
bill gives to the birds of this genus a very extraordinary appearance. They have short legs, very short tail, and short wings; their legs are placed far back, and they sit very erect, like auks and penguins, resting not merely on the foot, but on the tarsus. Notwithstanding their shortness of wing, they fly rapidly, although they seem incapable of long-sustained flights. They swim and dive admirably. The best known and most widely distributed species is the COMMON P. (*F. arctica*), a native of the arctic and northern temperate regions, breeding not only in high northern latitudes, but as far south as the coasts of England, and migrating from the colder regions in winter, when it is to be found even on the coasts of Spain and of Georgia. The P. is a little larger than a pigeon; the forehead, crown, back of the head, a collar round the neck, the back, wings and tail are black, the other parts of the plumage white. The P. lays only a single egg, sometimes in a rabbit burrow, but more frequently in a burrow of its own, which often extends three feet, and is not unfrequently curved; sometimes in deep fissures or crevices of cliffs. Great numbers congregate together, and their chosen breeding-places are crowded with them. These are mostly on unfrequented islands and headlands, where there is some depth of soil. In some of them, the ground is covered by puffins, old and young, in thousands. The eggs are sought after by fowlers, and also the young birds, the flesh of which is used for food. The Scilly Isles were held in the 11th c., under the king as Earl of Cornwall, by Ranulph de Blancminster, for an annual payment of 6*s.* 8*d.*, or 300 puffins at Michaelmas. Puffins are not readily



Common Puffin (*Fratercula arctica*).

alarmed by the approach of man, and many are taken by means of a noose at the end of a rod. Their food consists of small crustaceans and fishes. —Other species are found in different parts of the world; one in Kamtchatka, the Kurile Islands, &c., with two silky tufts of long feathers on its head. —The name P. is given in France to the *Shearwaters* (q. v.), or *Puffin Petrels*, the genus *Puffinus* of some ornithologists.

PUG, or PUG-DOG, a kind of dog much like the bull-dog in form, and in particular, in its much abbreviated muzzle. The nose is often a little turned up. The disposition is, however, extremely unlike that of the bull-dog, being characterised by great timidity and gentleness. Pug-dogs are only kept as pets. They are often very affectionate and good-natured, bearing without resentment the roughest handling to which children can subject them. They are all of small size. The common English Pug is usually yellowish with a black snout, the tail firmly curled over the back. New breeds have



Chinese Pug (Looty), found in the Summer Palace at Pekin. Presented to Her Majesty.

of late been introduced from China and Japan, interesting from their peculiar appearance, gentleness, and docility, with extremely short *puggish* muzzle; the Chinese breed very small, with smooth hair; the Japanese rather larger, with an exuberance of long soft hair and a very bushy tail.

PU'GET SOUND, a collection of inlets on the north-western border of Washington Territory, U.S., forming the southern termination of Admiralty Inlet, which communicates with the Pacific by the Strait of St Juan de Fuca, south-east of Vancouver's Island. It forms a sheltered bay and harbour of about 15 square miles, surrounded by a fertile well-timbered country.

PU'GGING, a coarse kind of plaster laid on deafening-boards between the joists of floors, to prevent sound.

PU'GILISM, or BOXING, is the art of defending one's self or attacking others with the weapons which nature has bestowed—viz., fists and arms. The origin of boxing, or the use of the fists, is likely as old as man himself. We find numerous allusions to it in the classic authors. Pollux, the twin-brother of Castor in the heathen mythology, was reckoned the first who obtained distinction by the use of his fists, conquering all who opposed him, and obtaining, with Hercules, a place among the gods for his sparring talents. The ancients were not, however, satisfied with the use of the weapons of nature, but increased their power by the addition of the Cestus (q. v.). With the ancients, pugilism was considered an essential part in the education of youth, and formed part of the course of training practised in their gymnasia; it was valued as a means of strengthening the body and banishing fear; but it was practised in public rather with a view to the exhibition of the power of endurance than for mere skilful self-defence. The earliest account we have of systematic British boxing is in 1740, when public exhibitions of professors of the art attracted general attention. Up to this period, the science of self-defence had made but little progress, and strength and endurance constituted the only recommendations of the practitioners at Smithfield, Moorfield, and Southwark fair, which had long had booths and rings for the display of boxing. Broughton, who occupied the position of 'champion of England,' built a theatre in Hanway Street, Oxford Street, in 1740, for the display of boxing; advertisements were issued announcing a succession of battles between first-rate

pugilists, who never quitted the stage till one or other was defeated, the reward of each man being dependent upon, and proportioned to, the receipts. Broughton was for 18 years champion of England, and with him commences the first scientific era of pugilism. He propounded some rules for the regulation of the ring, and these remained in authority till 1838, when they were materially altered. Rule 1 is, That a square of a yard be chalked in the middle of a stage, and that in every fresh set-to after a fall, the seconds are to bring their men to the side of the square, and to place them opposite each other, and until this is done, it is not lawful for one to strike the other. Rule 2, That if either of the combatants is unable to be brought up to the square within 30 seconds after a fall and the close of a round, he shall be deemed a beaten man. No man is permitted to hit his adversary when he is down, or to seize him by the breeches, or below the waist, and a man on his knees is to be reckoned down. These rules laid the foundation of fair play, and robbed boxing of half its horrors. To Broughton also is due the introduction of gloves for 'sparring-matches,' where lessons could be taken without injury. The greatest professor of the art was Jackson, who was champion in 1795. He was not only the most scientific boxer of his day, but he gave his art such a prestige and popularity that half the men of rank and fashion of the period were proud to call themselves his pupils. He opened rooms for the practice of boxing in Bond Street, and for years these were crowded by men of note. His 'principles of pugilism' were, that contempt of danger and confidence in one's self were the first and best qualities of a pugilist; that in hitting, you must judge well your distances, for a blow delivered at all out of range, was like a spent shot, and valueless; that men should fight with their legs, using all possible agility, as well as with their hands; and that all stiffness of style and position was wrong. Jackson is still regarded as the best theorist on the 'noble art,' and since his time, it has received no essential improvement. Shaw, the Life Guardsman, who immortalised himself at Waterloo, was a pupil of his, and the prowess which he so brilliantly displayed on that occasion, was owing as much to his scientific training as to his great strength. At this period, pugilism was actively supported by many persons of high rank —the Dukes of York and Clarence, the Earls of Albemarle, Sefton, &c., Lords Byron, Craven, Pomfret. In 1814, when the allied sovereigns were in England, among other entertainments, a 'sparring' display was provided under Jackson's management; and the distinguished foreigners expressed the great gratification they had experienced from the exhibition of so much science and fine physical development. Besides Jackson, Belcher, Gulley, and Cribb were noted champions at this period. George IV. was a staunch patron of boxing in his youth, and although he discontinued by his presence to give countenance to the sport, frequent indications were observable of his desire for its promotion. At the time of the coronation, when the popular feelings were much enlisted on behalf of Queen Caroline, who was excluded from the throne, a body of pugilists were employed to preserve order; and so well did these men perform their duties, that the king presented each man with a gold medal, to commemorate the event, and to shew his satisfaction. This period may be termed the 'palmy days of the ring;' and from various causes, its decline has since then been uninterrupted. Among other causes, several cases occurred of prize-fighters who were tempted to lose fights on which large sums had been staked, and to deceive their most influential backers. The more distinguished patrons of the ring gradually seceded; the 'Pugilistic Club' which had been established in 1814, and which included all the aristocratic patrons of the ring, was broken up. The magistracy of the country set their faces against the lawless assemblies of 'roughs' and pickpockets who latterly formed the greater part of the spectators at prize-fights. The electric telegraph, and the establishment of an efficient rural police, have given the finishing touches to an already-expiring profession. Matches can now only be got up by stealth, and the place of meeting is kept a profound secret to the last moment, for fear of interruption. A few years ago, however, the international combat between Tom Sayers the Englishman, and John Heenan the American, revived for a moment public interest in the art; but apart from exceptional matches, the popular feeling is that prize-fighting should not be countenanced, and we may look for its gradual extinction. The art of boxing, as an active and healthy exercise, is likely to be maintained; and the display of science between two accomplished boxers is very interesting, while it is deprived of all the horrors of the prize-ring; the rapidity of the blows, the facility with which they are mostly guarded or avoided by moving the head and arms; the trial of skill and manœuvre to gain a trifling advantage in position, all give a wonderful interest to the spectator, who can watch the perfection of the art devoid of the brutalities of the ring. The pugilists of the present day are mostly publicans; their friends and the patrons of the 'fancy' meet at their houses for convivial evenings, sparring-matches, ratting, and the like. It has constantly been urged in defence of pugilism, that were it abolished, the use of the knife would increase, and Englishmen would lose their present manly system of self-defence. This may be true, if the use of the fist in self-defence depended on the mercenary exhibition of pugilistic encounters, which, however, is mere assumption.—The best authority on the subject of pugilism is *Fistiana*, 24th ed. 1863, office of *Bell's Life*.

PULCI, Luigi, an Italian poet of distinguished family, was born at Florence, 3d December 1431, and devoted his life to study and to literary composition. He was one of the most intimate friends of Lorenzo de' Medici and of Poliziano, from the latter of whom he derived no little assistance in the composition of his poem *Il Morgante Maggiore* (Morgante the Giant). This celebrated work, a burlesque epic (in 28 cantos), of which Roland is the hero, is a vivacious parody of the romances of Carlovingian chivalry, which had become (as P. thought) undeservedly popular in Italy. His mocking imagination took a pleasure in turning into ridicule the combats with giants, the feats of magicians, and all the incredible adventures that form the material basis of the medieval epic; and he manages to do it with a wonderfully pleasant and original naïveté. But although the poem is essentially heroico-comic, it occasionally contains passages of the finest pathos, in which P. fortunately seems to forget his design of travestying the inventions of the *trouvères*, and comes out undisguisedly as a real poet. Moreover, in the midst of the most extravagant buffooneries, we come upon the truest and most natural pictures of manners—the vanity and inconstancy of women, the avarice and ambition of men. P. died in 1487. The *Morgante Maggiore* is one of the most valuable sources for acquiring a knowledge of the early Tuscan dialect, the niceties and idioms of which have been employed by P. with great skill. The first edition appeared at Florence in 1488, and has since been frequently reprinted. Other works of

P, are a series of sonnets (often grossly indecent), *La Beca du Dicomano* (a parody of a pastoral poem by Lorenzo de' Medici); *Confessione a la San Vergine*, a novel; and some letters.—BERNARDO PULCI, elder brother of Luigi, wrote an elegy on the death of Simonetta, mistress of Julian de' Medici; and a poem on the passion of Christ, and also executed the first translation of the *Eclogues* of Virgil.—LUCA PULCI, another brother, achieved some literary reputation too by his *Giostra di Lorenzo de' Medici*, a poem in honour of the success won by Lorenzo in a tournament; *Il Ciriffo Calvaneo*, a metrical romance of chivalry; *Driadeo d'Ancore*, a pastoral poem; and *Epistole Eroide*.

PU'LEX. See FLEA.

PULKO'VA, a village of Russia, in the government of St Petersburg, about 9 miles south of the capital, contains a population of 600. It stands on a ridge called the Pulkova Hills, which command a splendid view of St Petersburg, and is noted for its magnificent observatory, built by the Czar Nicholas, and placed under the direction of M. Friedrich Struve. For an interesting description of the observatory, see Professor C. Piazzi Smyth's *Three Cities in Russia* (2 vols., Lond. 1862).

PU'LLEY, one of the Mechanical Powers (q. v.), consists of a wheel, with a groove cut all round its circumference, and movable on an axis; the wheel, which is commonly called *a sheave*, is often placed inside a hollow oblong mass of wood called a *block*, and to the sides of this block the extremities of the sheave's axle are fixed for support; the cord which passes over the circumference of the sheave is called the *tackle*. Pulleys may be used either singly or in combination; in the former case, they are either *fixed* or *movable*. The *fixed pulley* (fig. 1) gives no mechanical advantage; it merely changes the direction in which a force would naturally be applied to one more convenient—thus, W can be raised without lifting it directly by merely pulling P down. The *single movable pulley*, with parallel cords, gives a mechanical advantage = 2 (fig. 2), for a little consideration will shew that as the weight, W, is supported by two strings, the strain on each string is ½W, and the strain on the one being supported by the hook A, the power, P, requires merely to support the strain on the other string, which passes round C. The fixed pulley, C, is only of service in changing the naturally upward direction of the power into a downward one. If the strings in the single movable pulley are not parallel, there is a diminution of mechanical advantage—i. e., P must be more than half of W to produce an exact counterpoise; if the angle made by the strings is 120°, P must be equal to W; and if the angle be greater than this, there is a mechanical disadvantage, or P must be greater than W. The following are examples of different combinations of pulleys, generally known as the first, second, and third systems of pulleys. In the first system, one end of each cord is fastened to a fixed support above; each cord descends, passes round a pulley (to the lowest of which the weight, W, is fastened), and is fastened to the block of the next pulley, with the exception of the last cord, which passes round a fixed pulley above, and is attached to the counterpoise P. The tension of a string being the same in all its parts, the tension of every part of the string marked (1) in fig. 3 is that which is produced by the weight of P, consequently, as the last movable pulley is supported on both sides by a string having a tension P, the tension applied in its support is 2P. The tension of the string marked (2) is therefore 2P, and the second movable pulley is supported by a force equal to 4P. It may similarly be shewn that the force applied by the strings marked (4) in support of the last pulley (which is attached to W), is 8P. Hence we see, that according to this arrangement, 1 lb. can support 4 lbs., if two movable pulleys are used; 8 lbs., if there are 3 movable pulleys; 16 lbs., if there are 4 movable pulleys; and if there are n movable pulleys, 1 lb. can support 2^n lbs. It must be noticed, however, that in practice, the weight of the cords, and of the pulleys, and the friction of the cord on the pulleys, must be allowed for; and the fact, that in this system all of these resist the action of the power P, and that to a large extent has rendered it of little use in practice.—The second system is much inferior in producing a mechanical advantage, but it is found to be much more convenient in practice, and is modified according to the purpose for which it is to be used; two prevalent forms are given in figs. 4 and 5. In this system, one string passes round all the pulleys, and as the tension in every part of it is that produced by the weight of P, the whole force applied to elevate the lower block with its attached weight, W, is the weight P multiplied by the number of strings attached to the lower block; in fig. 4, W = 4P, and in fig. 5, W = 6P, the pulleys in the upper block being only of use in changing the direction of the pulling force. This system is the one in common use in architecture, in dockyards, and on board ship, and various modifications of it—such as White's pulley, Smeaton's pulley, &c., have been introduced; but the simpler forms shewn above have been found to answer best.—The third system (fig. 6) is merely the first system inverted, and it is a little more powerful, besides having the weight of the pulleys to support the power, instead of acting in opposition to it, as in the former case. By this time, it will have been evident to the reader that the mechanical advantage is not produced by the pulleys, but by the strings, and that the pulleys are merely useful in keeping the strings in a certain position, changing with as little friction as possible the direction of the pull, and

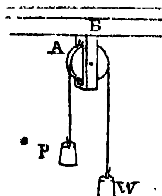


Fig. 1.

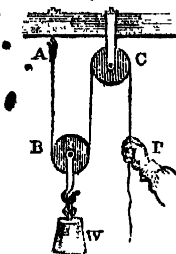


Fig. 2.

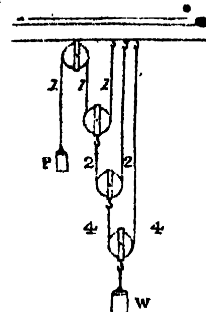


Fig. 3.

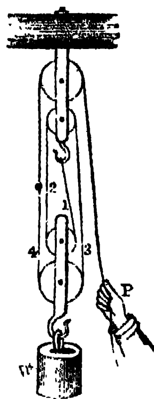


Fig. 4.

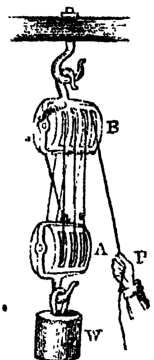


Fig. 5.

affording a convenient means of attaching the weight. Theoretically, the larger the number of movable pulleys in one combination, the greater is the mechanical advantage afforded; but the enormous friction produced, and the want of perfect flexibility in the ropes, prevent any great increase in the number of pulleys.

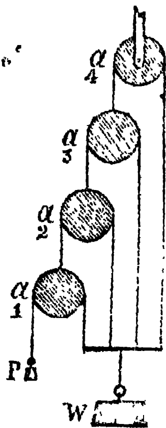


Fig. 6.

PULMONA'TA, an order of gasteropodous molluscs, having, for the purpose of respiration, a vascular air-sac or lung, which opens by a hole under the margin of the mantle, capable of being contracted or dilated at pleasure. Some are terrestrial, some aquatic. Slugs and snails are familiar examples of the former; water-snails, or pond-snails (*Limnæa*, *Planorbis*, &c.), of the latter. Most of the P. are protected by a shell; in some, as slugs, the shell is internal and rudimental.

PULNEYS, a range of hills in the Madura district of the Madras Presidency of India. The average height of this range is about 7500 feet above the level of the sea. It possesses peculiar advantages for the establishment of a sanitarium. The climate is one of the most equable anywhere to be found, the variation of the thermometer during twelve months in a closed room without a fire being observed to be no greater than between 58° and 62°. At present, there are only a few European residences built on these hills.

PU'LO-PENA'NG. See PRINCE OF WALES' ISLAND.

PULP, a term employed to describe those very soft and succulent parts of plants, almost exclusively of fruits, which consist of cellular tissue with much juice. The pulp of a fruit is sometimes found in one part of it, sometimes in another; thus, in the peach, plum, and other drupes, it is the *mesocarp*; in the grape and gooseberry, it is developed from the placentas, and the seeds are embedded in it.

PU'LPIT (Lat. *pulpitum*), an elevated tribune or desk, from which sermons, lectures, and other solemn religious addresses are delivered. In great churches, the pulpit is commonly placed against the wall, or in juxtaposition with a pillar or buttress. Originally it would appear to have been used chiefly for the singing, chanting, or recitation which form part of the public service, and was a kind of stage sufficiently large to accommodate two or even more chanters. For the convenience of the hearers, this stage began to be used by the bishop, priest, or deacon, for the delivery of the homily; and thus by degrees a tribune expressly suited to the latter use alone came to be introduced. In some of the older churches, the *ambo* or *pulpitum* is still used for the chanting of the Gospel and Epistles. In Catholic churches, the pulpit is generally distinguished by some religious emblems, especially by the crucifix; and the pulpits of the Low Countries and of Germany are often masterpieces of wood-carving, the preaching-place in some of them forming part of a great artistic group, as of the Conversion of St Paul, the Vocation of Peter and Andrew, the Temptation of Adam and Eve, and other similar subjects. The pulpit (in Arabic, *mimber*) forms


Pulpit (Fotheringhay, Northamptonshire, 1440 A. D.).
(From Parker's *Glossary*.)

one of the scanty appliances of Mohammedan worship.

PULQUE, a favourite beverage of the Mexicans and of the inhabitants of Central America, and some parts of South America; made from the juice of different species of *Agave* (q. v.), which is collected by cutting out the flowering-stem from the midst of the leaves in the beginning of its growth, and scooping a hole for the juice. From this cavity, large quantities of juice are removed daily for months. The juice is an agreeable drink when fresh, but is more generally used after fermentation, when it has a very pleasant taste, but a putrid smell, disgusting to those unaccustomed to it. Pulque is retailed in Mexico in open sheds called *Pulquerias*, which also serve for dancing-rooms. When mixed with water and sugar, and allowed to ferment for a few hours, it forms a beverage called *Tepache*. A kind of spirit is also prepared from it.

PULSE (Lat. *puls*), a name for the edible seeds of leguminous plants, as *corn* is the name for the edible seeds of grasses. Peas and beans are the most common and important of all kinds of pulse; next to them may be ranked kidney-beans, lentils, chick-peas, pigeon-peas, &c. *Legumine* (q. v.), a very nitrogenous principle, abounds in all kinds of pulse. Legumine forms a thick coagulum with salts of lime, wherefore all kinds of pulse remain hard if boiled in spring-water containing lime. The best kinds of pulse are very nutritious, but not easy of digestion, and very apt to produce flatulence.

PULSE (Lat. *pulsus*, a pushing or beating). The phenomenon known as the arterial pulse or arterial pulsation is due to the distention of the arteries consequent upon the intermittent injection of blood into their trunks, and the subsequent contraction which results from the elasticity of their walls. It is

perceptible to the touch in all excepting very minute arteries, and in exposed positions is visible to the eye. 'This pulsation,' says Dr Carpenter, 'involves an augmentation of the capacity of that portion of the artery in which it is observed; and it would seem to the touch as if this were chiefly effected by an increase of diameter. It seems fully proved, however, that the increased capacity is chiefly given by the elongation of the artery, which is lifted from its bed at each pulsation, and when previously straight, becomes curved; the impression made upon the finger by such displacement not being distinguishable from that which would result from the dilatation of the tube in diameter. A very obvious example of this upheaval is seen in the prominent temporal artery of an old person.'—*Principles of Human Physiology*, 4th ed., p. 492. The number of pulsations is usually counted at the radial artery at the wrist, the advantages of that position being that the artery is very superficial at that spot, and that it is easily compressed against the bone. In some cases, it is preferable to count the number of contractions of the heart itself.

The qualities which are chiefly attended to in the pulse are its frequency, its regularity, its fulness, its tension, and its force.

The *frequency* of the pulse varies greatly with the age. In the fœtus *in utero*, the pulsations vary from 140 to 150 in the minute; in the newly-born infant, from 130 to 140; in the 2d year, from 100 to 115; from the 7th to the 14th year, from 80 to 90; from the 14th to the 21st year, from 75 to 85; and from the 21st to the 60th year, 70 to 75. After this period, the pulse is generally supposed to fall in frequency, but the most opposite assertions have been made on this subject. There are many exceptions to the preceding statement; young persons being often met with having a pulse below 60, and cases not unfrequently occurring in which the pulse habitually reached 100, or did not exceed 40 in the minute, without apparent disease. The numbers which have been given are taken from an equal number of males and females, and the pulsations taken in the sitting position. The influence of sex is very considerable, especially in adult age, the pulse of the adult female exceeding in frequency that of the male of the same age by from 10 to 14 beats in the minute. The effect of muscular exertion in raising the pulse is well known; and it has been found by Dr Guy that posture materially influences the number of pulsations. Thus, in healthy males of the mean age of 27 years, the average frequency of the pulse was, when standing, 81, when sitting, 71, and when lying, 66, per minute; while in healthy females of the same age the averages were—standing, 91; sitting, 84; and lying, 79. During sleep, the pulse is usually considerably slower than in the waking state. In disease (acute hydrocephalus, for example), the pulse may reach 150 or even 200 beats; or, on the other hand (as in apoplexy and in certain organic affections of the heart), it may be as slow as between 30 and 20.

Irregularity of the pulse is another condition requiring notice. There are two varieties of irregular pulse: in one, the motions of the artery are unequal in number and force, a few beats being from time to time more rapid and feeble than the rest; in the other variety, a pulsation is from time to time entirely left out, constituting intermission of the pulse. These varieties often concur in the same person, but they may exist independently of each other. Irregularity of the pulse is natural to some persons; in others, it is the mere result of debility; but it may be caused by the most serious disorders, as by disease of the brain, or by organic disease of the heart; and hence the practical importance of ascertaining the various meanings of this symptom.

The pulse is said to be *full* when the volume of the pulsation is greater than usual, and it is called *small* or *contracted* under the opposite condition. A full pulse may depend upon general plethora, on a prolonged and forcible contraction of the left ventricle of the heart, and possibly, to a certain extent, on relaxation of the arterial coats; while a small pulse results from general deficiency of blood, from feeble action of the heart, from congestion of the venous system, or from exposure to the action of cold. When very small, it is termed *thread-like*.

The *tension* of the pulse is the property by which it resists compression, and may be regarded as synonymous with *hardness*. A hard pulse can scarcely be stopped by any degree of pressure of the finger. It occurs in many forms of inflammation, and its presence is commonly regarded as one of the best indications of the necessity of venesection. A *soft* or compressible pulse is indicative of general weakness.

The *strength* of the pulse depends chiefly on the force with which the blood is driven from the heart, but partly also upon the tonicity of the artery itself and the volume of the blood. A strong pulse is correctly regarded as a sign of a vigorous state of the system; it may, however, arise from hypertrophy of the left ventricle of the heart, and remain as a persistent symptom even when the general powers are failing. As strength of the pulse usually indicates vigour, so *weakness* of the pulse indicates debility. There may, however, be cases in which weakness of the pulse may occur in association with undiminished energy of the system at large. For example, active congestion of the lungs may so far impede the passage of the blood through these organs that it cannot reach the heart in due quantity; the necessary result is a weak and feeble pulse, which will rapidly increase in strength if the congestion is relieved by free blood-lettings. Various expressive adjectives have been attached to special conditions of the pulse, into the consideration of which our space will not permit us to enter. Thus, we read of the jerking pulse, the hobbling pulse, the corded pulse, the wiry pulse, the thrilling pulse, the rebounding pulse, &c.

PULTOWA. See POLTAVA.

PU'LTUSK, a town of Poland, in the government of Plock, is situated in a thickly-wooded district on the Narew, 35 miles north-north-east of Warsaw. It contains numerous churches and a very large bishop's palace. Pop. 4772. Here, on December 26, 1806, was fought one of the battles of the campaign of Eylau, between the Russians and the French. The field was most obstinately contested, but the victory, which, however, was claimed by both armies, inclined in favour of the French.

PU'LU, a beautiful substance, resembling fine silk, of a rich brown colour and satin lustre, used largely as a styptic by the medical practitioners of Holland, and lately introduced into this country for the same purpose. It consists of the fine hairs from the stipes of one or more species of tree-fern, referrible, without doubt, to the genus *Cibotium*. It was first imported into this country in 1844 from Owhyhee under the name of Pulu, or vegetable silk, and was proposed as a substitute for silk in the manufacture of hats, but could not be applied. In 1856, it was again imported from Singapore under the Malay names of Penghawar Djambi and Pakoe Kidang, and was said to have been used in Dutch pharmacy for a long period as a styptic. Several importations have since taken

place, and it has been successfully used. It acts mechanically by its great absorbent powers.

PU'MA, or COUGAR (*Felis concolor*, *Leopardus concolor*, or *Puma concolor*), one of the largest of the American *Felidæ*, rivalled only by the jaguar. It is sometimes called the American Lion, although it is more allied to the leopard, notwithstanding its want of spots and stripes. It is from 4 to 4½ feet in length from the nose to the root of the tail, and the tail about 2 feet or 2½. The fur is thick and close, reddish-brown above, lighter on the sides, and reddish-white on the belly; the muzzle, chin, throat, and insides of the legs grayish-white, the breast almost pure white. Young pumas have dark-brown spots in three rows on the back, and scattered markings elsewhere, exhibiting the relation to the leopards. The long tail of the P. is covered with thick fur, and is generally coiled up, as if it were prehensile, which it does not seem to be, although the P. climbs trees very well, and often descends on its prey from among their branches. The P. was formerly found in all except the coldest parts of America, but is now rare in most parts of North America, having been expelled by man. It rarely attacks man, but is very ready to prey on domestic animals, and seems to have a thirst for blood beyond that of other *Felidæ*, one P. having been known to kill 50 sheep in a night, drinking a little of the blood of each; a very sufficient reason for the anxiety which all American farmers shew for its destruction. Yet it is easily tamed, and when tamed, a very gentle creature, purring like a cat, and shewing equal love of attentions. The geographical range of the P. extends far southwards in Patagonia, and northwards even to the state of New York, although it is now very rare in all long-settled parts of North America. It is the *Painter* (Panther) of North American farmers. It sometimes issues from the forests, and roams over prairies and pampas, and is not unfrequently caught by the lasso of South American hunters.—A BLACK P. (*Felis nigra* of some naturalists), a doubtful species, and probably only a variety of the common P., is found in some parts of South America.

PU'MICE, a mineral found in volcanic countries, generally with obsidian and porphyries. In chemical composition, it agrees with obsidian, of which it may be regarded as a peculiar form, rapidly cooled from a melted and boiling state. It is of a white or gray colour, more rarely yellow, brown, or black; and so vesicular, that in mass, it is lighter than water, and swims in it. The vesicles, or cells, are often of a much elongated shape. P. often exhibits more or less of a filamentous structure; and it is said to be most filamentous when silica is most abundant in its composition. It is very hard and very brittle. It is much used for polishing wood, ivory, metals, glass, slates, marble, lithographic stones, &c., and in the preparation of vellum, parchment, and some kinds of leather. Among other purposes to which it is applied is the rubbing away of corns and callosities. Great quantities are exported from the Lipari Isles to Britain and all parts of Europe. The Lipari Isles are in great part composed of P., which there, as in some other places, occurs as a rock. P. is the chief product of some volcanic eruptions; but in some eruptions, none is produced. It is found also in regions where there are now no active volcanoes, as at Andernach on the Rhine.

PU'MPKIN. See GOURD.

PUMPS are machines for raising water and other fluids to a higher level. They are divided into several classes according to their mode of action. Of these, as the most important, we shall describe in detail the following: 1. The Lift or Suction Pump; 2. The Lift and Force Pump; 3. The Chain-pump; 4. The Centrifugal Pump; 5. The Jet-pump.

1. *The Lift or Suction Pump.*—The diagrams figs. 1 and 2 represent the ordinary suction pump. A is a cylinder, which is called the barrel; with it is connected at the bottom a pipe, B, which communicates with the water to be raised; and at its top is another pipe, C, which receives the water raised. In the barrel are placed two valves, D and E. D is fixed in position at the bottom of the barrel; E is

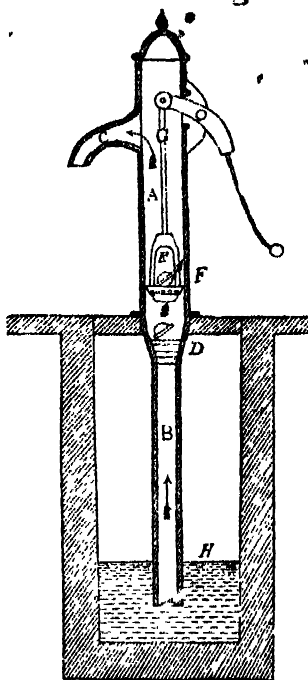


Fig. 1.

attached to, and forms part of the piston F, which moves up and down the barrel when motive-power is applied to the rod G. The piston, or bucket, consists of a cylindrical piece of wood or metal, which fits exactly the barrel in which it moves, so that no water or air can pass between its circumference and the sides of the cylinder. This tight fitting is attained in wooden pistons by surrounding them with a leather ring; and in those of metal, by hemp or other packing, which is wrapped round a groove made in their outer surface. The hollow interior of the piston is closed at the top by the valve E, which is a kind of door opening on a hinge, at one side of it, in an upward direction, on the application of pressure, and shutting on to its seat on the piston when the pressure is removed. When opened, water or air can pass through it to the upper side of the piston; but when shut, none can pass from one side of the piston to the other. The other valve, D, is similar to it in all respects, except that, as before stated, it is fixed in the bottom of the barrel; it also can only open upwards.

To describe the action of the pump, we shall suppose the piston to be at the bottom of the barrel, and the pump to contain nothing but air. On moving the piston up the barrel—the valve in it being shut, and kept so by the atmospheric pressure above it—no air can pass from above it into the

part of the barrel from which it is moving; the air contained in which becoming rarefied, by having to occupy a greater space, exerts less pressure on the valve D at the bottom of the barrel than the air in suction-pipe B below it. This valve is thus opened, and the air from the suction-pipe enters the barrel; so that when the piston has arrived at the top, a volume of air equal to the contents of the barrel has passed from the suction-pipe into the barrel. When the piston descends, it compresses the air in the barrel, which shuts the valve D; and when the density of the compressed air becomes greater than that of the atmosphere, the valve E in the piston is forced open; and the air in the barrel passes to the upper side of the piston. The next upward stroke of the piston again draws a like quantity of air from the suction-pipe into the barrel; and, as none of this air again enters the pipe, but is passed to the upper side of the piston by its downward stroke, the suction-pipe is by degrees emptied of the air it contained. During this process, however, motion has taken place in the water at the foot of the suction-pipe. The surface of the water at H is pressed upon by the weight of the atmosphere with a pressure of about 15 lbs. on every square inch; and by the laws of fluid-pressure, if an equal pressure is not exerted on the surface of the water in the suction-pipe, the water will rise in it, until the pressure on its surface, plus the weight of its fluid column, balances the pressure of the atmosphere on the surface H outside; so that, as the air in the suction-pipe is rarefied, the water rises in it, until, when all the air is extracted from it, the water stands at the level of the valve D. By the next upward stroke of the piston, the barrel being emptied of air, the water follows the piston, and fills the barrel as it filled the suction-pipe. The pressure produced by the downward stroke shuts the valve D, and forces the water in the barrel through the valve E. The succeeding upward stroke carries this water into the pipe above, and again fills the barrel from the suction-pipe. In like manner, every successive upward stroke discharges a body of water equal to the content of the barrel into the pipe above it, and the pump will draw water as long as the action of the piston is continued.

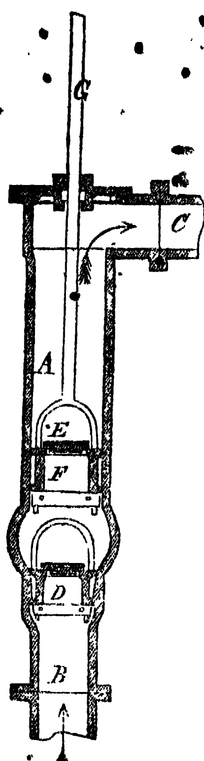
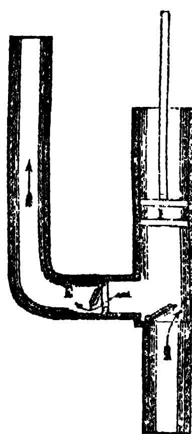


Fig. 2.

The action of this pump may be more shortly described by saying that the piston withdraws the air from the barrel, and produces a vacuum, into which the water rushes through the suction-pipe, impelled by the pressure of the atmosphere on its surface. This atmospheric pressure balances a column of water of about 33 feet in height, so that if the barrel be placed at a greater height than this from the surface of the water in the well, the water will not rise into it, and the pump will not draw.

With regard to its efficiency—that is to say, the relation between the power expended and the work produced, as measured by the water raised—we may remark, that the power is expended—1st, in raising the water through the required height; 2d, in overcoming the friction of the moving parts of the pump; 3d, in the friction and fluid resistance of the water in passing through the valves and pipes; 4th, in the losses arising from the want of proper proportion between the various parts of the pump. The losses arising from these last sources are very great, and vary so much according to the construction of each particular pump, that no useful estimate can be formed of the efficiency. We may say, however, that a pump of this description, to yield 50 per cent. of the applied power, must be well proportioned and carefully constructed.

2. *The Lift and Force Pump.*—Figs. 3 and 4 represent two varieties of this pump. That shewn in fig. 3 is very similar to the suction-pump before described, with this exception, that the valve E,


Fig. 3.

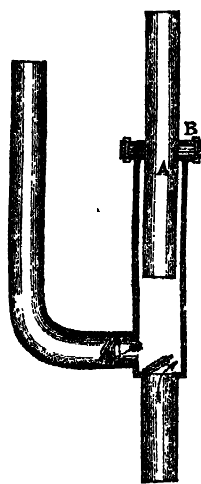


Fig. 4.

instead of being fixed on the piston, is placed in the discharge-pipe, the piston itself being solid. The water is drawn up into the barrel by suction in the manner just described in the suction-pipe, and then the pressure of the piston in its downward-stroke forces it through the valve E to any height that may be required. That shewn in fig. 4 is provided with a different description of piston, called the plunger-pole. Its action is precisely the same as that of the other, with this exception, that the plunger-pole, instead of emptying the barrel at every stroke, merely drives out that quantity which it displaces by its volume. It is simply a solid rod of metal, A, moving through a water-tight stuffing-box, B. This stuffing-box is made by placing, on a circular flange of metal, rings of india-rubber or other packing, the inner diameter of which is slightly less than that of the plunger-pole. On these is placed a ring of metal, and through the whole are passed bolts, which, on being screwed tight, force the packing tightly against the plunger-pole. It possesses many advantages, for the packing can be tightened and repaired without removal of the piston or stoppage of the pump; also, the cylinder is not worn by its action, nor does it require to be accurately bored out, as in the other form of pump.

In these pumps, it will be observed that the water is forced into the ascending pipe or column only on the downward stroke; it will thus be

discharged in a series of rushes or jerks. As it is a great object to procure a continuous discharge, both for its convenience, and for the saving of the power wasted by the continual acceleration and retardation of the ascending column, various methods have been used for that purpose. The most common is the reservoir of air, which is an air-tight receptacle fixed vertically on the discharge-pipe; the water forced into the pipe by the down-stroke compresses this air, which, acting as a spring, returns this force to the ascending column during the period of the up-stroke, and so, by taking the blow of the entering water, and returning it gradually, equalises the pressure, and renders the discharge uniform. Another method is the double-action force-pump, by which equal volumes of water are forced into the ascending column by both up and down strokes. An example of this is shewn in fig. 5. The solid piston A is worked by a rod B of half the section of the piston itself. During the up-stroke, the upper surface forces a volume of water into the ascending column, and the lower surface draws in twice that volume. In the down-stroke, these two volumes are sent through the pipe E into the receptacle C, communicating with the upper face of the piston. One of the volumes fills the space D, which would otherwise be left empty by the descent of the piston; the other volume is sent into the ascending column; so that a volume of water equal to half the content of the barrel is sent into the ascending column by both the up and the down strokes.

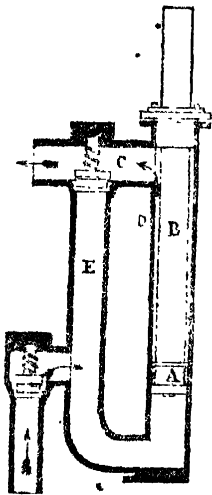


Fig. 5.

A pump exhibited in the International Exhibition of 1862, by Messrs Farcot and Sons, attains this object in a much more simple manner. In it 'two equal pistons, with valves affording very large water-ways, work parallel to each other in two pump cylinders. During the successive strokes, the first piston draws in water by its upper surface, and delivers it to the ascending column by causing it to traverse the second piston. In its ascending course, the second piston raises in its turn the column of water by its upper face, while the lower face sucks the water, causing it to traverse the first piston.' It will be seen from this description that a valve is placed in each piston, that the cylinders communicate at their base, and that the pistons make their strokes simultaneously. This pump has yielded all the good results promised by its ingenious construction, and it is adopted in the water-supply of Paris.

In spite of the great antiquity of the lift and force pump, it is only of late years that improvements have been introduced into its construction capable of rendering it an efficient machine—that is, one which returns in the shape of water raised, a good proportion of the power applied to it. In 1849, M. Morin found by experiments that the power lost was 55 to 82 per cent.—that is to say, that of the motive-power, 45 per cent. was yielded in the best and 18 in the worst, giving an average of about 30 per cent. In 1851, the jury, reporting on those exhibited in the Great Exhibition, say that it is one of our worst machines, considered in a mechanical sense, as a means of producing a given result with the least possible expense of power. In those exhibited in the International Exhibition of 1862, we find a marked improvement. The jury report that 'a large number of constructers have sought to give the waterways and valves dimensions which render as small as possible the loss of power by friction. They have also sought to give a continuous movement to the ascending column of water, independently of the action of the reservoir of air.'

3. *The Chain-pump.*—This pump is formed in general of plates of wood fastened to an endless iron chain, and moving upwards in a rectangular case or box. Fig. 6 shews an example of this pump, which was exhibited in the International Exhibition of 1862, called 'Murray's Chain-pump;' a pump which is very much used on public works, on account of the ease of its construction and erection, and its admirable efficiency even at considerable heights. In this pump, the friction is reduced by having only 3 or 4 lifts instead of 20 or 30, as was previously the case. The chains pass under a roller, A, at the foot, and are driven by a small pitch-wheel, B, at the top, over which they are conducted, and which is driven by appropriate gearing. The lifts feather in passing over the wheel to the descending side, and only unfold when brought round to the ascending side; thus the pump is enabled to take off the water with the same dip as other pumps. The pump is not liable to be choked, as a back turn of the chain immediately releases any substance getting between the lift and the barrel. The speed is variable, in proportion to the duty required. The speed at which the chain is ordinarily worked is from 200 to 300 feet per minute. The greatest lift yet made by Murray's chain-pump is 60 feet high; but it is considered that 100 tons of water per minute could be raised 100 feet high. From 10 to 12 feet apart has been found to be the best pitch for the lifts; putting

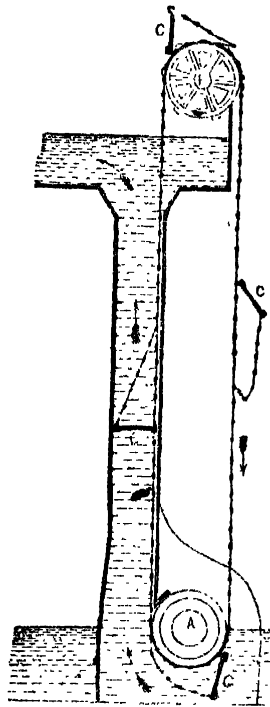


Fig. 6.—Murray's Chain-pump.

them nearer, needlessly increases the friction. Experiments made by Mr Lovick for the Metropolitan Board of Works, showed that the slip of the lifts which work in the barrel, and are one-eighth of an inch shorter each way than the barrel, averaged 20 per cent. of their motion, and that the useful work done averaged 63 per cent. of the indicator horse-power of the engine working it.

4. *The Centrifugal Pump.*—These pumps, with reference to those previously described, may be called new, as, though they have been in use in one form or another for at least a century, their merits were not brought prominently forward till the year 1851, when the great efficiency of the models exhibited by Messrs Appold, Gwynne, and Bessemer drew general attention to the subject.

The essential parts of this pump are—1. The wheel to which the water is admitted at the axis, and from which it is expelled at the circumference, by the centrifugal force due to the rotatory motion imparted to it in passing through the rapidly revolving wheel; and 2. The casing or box in which the wheel works, and by which the entering water is separated from that discharged.

Figs. 7 and 8 are a section and plan of a centrifugal pump. The water enters the pump by the

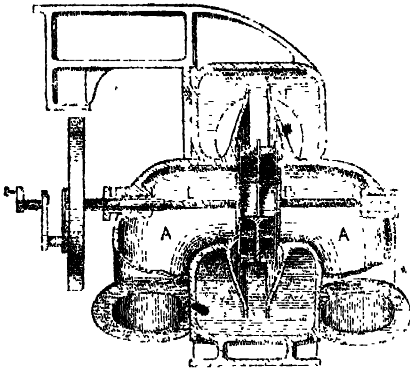


Fig. 7.

supply-pipes A, A, which lead to the central orifices of the wheel B, B; it then passes through the passages C, C, formed by the vanes and the side covering-plates, D, of the wheel. In passing through

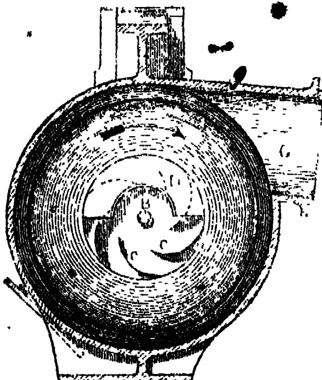


Fig. 8.—Thomson's Centrifugal Pump.

these passages of the wheel, which is made to revolve by power applied to the shaft E, it acquires a rotatory motion, which still continues when it leaves the circumference of the wheel, and enters the circular whirlpool chamber F; so that the interior of the pump may be looked on as a whirlpool, extending from the axle of the wheel to the circumference of the whirlpool chamber. Into this whirlpool the water is drawn at the central orifice of the wheel, and discharged by the pipe G at the circumference of the whirlpool chamber; and the force with which it is discharged, or the height to which it will rise in the pipe G, is measured by the centrifugal force of the water revolving in the whirlpool.

With reference to the efficiency of these pumps, it is impossible to give any accurate estimate, since as high as 70 per cent. of the applied power is claimed to be returned by forms of the pump shewn in figs. 7 and 8, while some other descriptions experimented on in 1851 gave only 18 per cent. of useful effect.

It will be evident, from the above description of the pump, that the height to which the water will be raised depends entirely upon the speed of revolution of the wheel; and it is by this that the application of centrifugal pumps is limited to comparatively low lifts of say less than 20 feet, as the speed for high lifts requires to be greater than can be conveniently and usefully attained in practice. They are best applied when raising large quantities of water through low lifts. It will also be observed, that on account of the simplicity of their parts, and the absence of valves, they are much less liable than other pumps to be choked by the entrance of solid materials. In some descriptions of this pump, the exterior whirlpool chamber is dispensed with; and to the vanes of the wheel is given such a curvature backwards from the direction of motion, that the water leaving the circumference of the wheel is spouted backwards from the vane-passages with a speed equal to that of the wheel in the opposite direction, so that it has only a radial motion with reference to a fixed object; in other words, that the force is acquired from the radial component of the pressure of the vanes, instead of the centrifugal force of the revolving water. Those pumps, however, give the best results which, as the one above described, combine both actions. In all cases, curved vanes are much superior to straight ones.

5. *The Jet-pump.*—This pump is worked by water-power, and is worthy of notice on account of the extreme simplicity of its parts, and of not requiring the care of an attendant while in operation.

Fig. 9 is a representation of this pump, C is the water which it is required to raise to the level of the water D, and B is the water in the stream available for working the pump. The water B passes down the pipe A, and is discharged from the jet or nozzle, E, into the conical pipe F. Round the nozzle is the vacuum-chamber G, at the bottom of which is attached the conical pipe F, and into the side of which the suction-pipe H enters from the water to be pumped. The water, in passing from the nozzle into the conical pipe, carries air with it, and so gradually forms a vacuum in the chamber G, when the water rises into it from the level C, through the pipe H; and it is in turn carried with the jet down the conical pipe into the discharge-level D. The velocity of the water coming from the jet is gradually retarded by the action of the conical pipe, the speed decreasing as the area of section increases; and the *vis viva* of its motion is by this retardation converted into a sucking force, drawing the water from the suction-pipe through the vacuum chamber into the conical pipe. The water issuing from the jet will have a speed equal to that produced by a column of the height BC, or the sum of

the fall and lift. This pump may be viewed, for purposes of explanation, as a syphon, into the shorter leg of which a jet of water is injected,

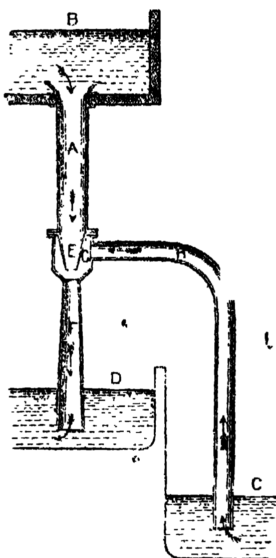


Fig. 9.

which overcomes the pressure due to the difference of levels, and reverses the ordinary motion of the water in a syphon. An efficiency of 18 per cent. has been obtained from this pump, which is low, as compared with that obtained from other descriptions of pump; yet in cases where waste of water-power is not so much to be avoided as expense in erecting, working, and maintenance, these pumps possess decided advantages. The case to which they are peculiarly applicable is the drainage of marshes, which have streams of water adjacent to them descending from a higher level.

PUN is the name given to a play upon words. The wit lies in the equivocal sense of some particular expression, by means of which an incongruous, and therefore ludicrous idea is unexpectedly shot into the sentence. One or two examples will make the matter clearer than any definition. Two persons looking at a beggar-boy with an extraordinary big head—'What a tower!' cried the first. 'Say, rather,' replied the second, 'what a *fort o' lice*' (fortalice).—A noted punster was once asked, with reference to Mr Carlyle's writings, if he did not like 'to expatiate in such a field.' 'No,' was the felicitous rejoinder; 'I can't get over the *style*' (stile).—A Massachusetts lady complaining to a friend that her husband (whose business had taken him to the far West) constantly sent her letters filled with expressions of endearment, but no money, was told, by way of comfort, that he was giving her a proof of his *unremitting* affection!

PUNCH, the chief character in a popular comic exhibition performed by means of *Puppets* (q. v.). Various accounts are given of the origin of the name. The exhibition is of Italian origin, and the Italian name is *Pulcinella*, or *Policinella*. According to one story, a peasant, a well-known character in the market-place of Naples, got the name Pulcinella from dealing in fowls (*pulcinelli*), and after his death was personated in the puppet-shows of the San-Carlino theatre. Another account makes the word a corruption of Puccio d'Aniello, the name of a witty buffoon of Acerra who joined a company of players and became the favourite of the Neapolitan populace. Others give his original name as Paolo Cinella. The variety and inconsistency of the legends shew them to be myths—histories invented to account for the name. The modern P. is only a modification of an ancient Mask (q. v.) to be seen represented on ancient vases, and taken perhaps from the Oscan Atellanæ; and the Italian name is pretty evidently a diminutive of *pollice*, the thumb—Tom Thumb (the dwarfs of northern mythology are sometimes styled *däumling*, thumkins). The English name *Punch* is apparently identical with Eng. *paunch*; Bavarian *punzen*, a cask; Ital. *punzone*, a puncheon; and denotes anything thick and short (e.g., a Suffolk *punch*). The name *Punchinello* seems to have arisen from blending the English and Italian names.

The drama or play in which the modern P. figures, is ascribed to an Italian comedian, Silvio Fiorillo, about 1600. The exhibition soon found its way into other countries, and was very popular in England in the 17th century. Its popularity seems to have reached its height in the time of Queen Anne, and Addison has given in the *Spectator* a regular criticism of one of the performances. The scenes as now given by the itinerant exhibiters of the piece are much shortened from what were originally performed, in which allusions to public events of the time were occasionally interpolated. The following is an outline of the plot as performed in 1813. Mr P., a gentleman of great personal attraction, is married to Mrs Judy, by whom he has a lovely daughter, but to whom no name is given in this piece, the infant being too young to be christened. In a fit of horrid and demoniac jealousy, P., like a second Zeluco, strangles his beauteous offspring. Just as he has completed his dreadful purpose, Mrs Judy enters, witnesses the brutal havoc, and *exit* screaming; she soon returns, however, armed with a bludgeon, and applies it to her husband's head, 'which to the wood returns a wooden sound.' P. at length exasperated seizes another bludgeon, soon vanquishes his already-weakened foe, and lays her prostrate at his feet: then seizing the murdered infant and the expiring mother, he flings them both out of the window into the street. The dead bodies having been found, police-officers enter the dwelling of P., who flies for his life, mounts his steed; and the author, neglecting, like other great poets, the confining unities of time and place, conveys his hero into Spain, where, however, he is arrested by an officer of the terrible Inquisition. After enduring the most cruel tortures with incredible fortitude, P., by means of a golden key, opens his prison-door, and escapes. The conclusion of the story is satirical, allegorical, and poetical. The hero is first overtaken by Weariness and Laziness in the shape of a black dog, which he fights and conquers; Disease, in the disguise of a physician, next arrests him; but P. 'sees through the thin pretence,' and dismisses the doctor with a few derogatory kicks. Death at length visits the fugitive; but P. lays about his skeleton carcass so lustily, and makes the bones of his antagonist rattle so musically with a bastinado, that 'Death his death's blow then received.' Last of all comes the Devil; first under the appearance of a lovely female, but afterwards in his own natural shape, to drag the offender to the infernal regions, to expiate his dreadful crimes. Even this attempt fails, and P. is left triumphant over Doctors, Death, and the Devil. The curtain falls amid the shouts of the conqueror, who, on his victorious staff, lifts on high his vanquished foe.

The well-marked peculiarities in the original personification of P., which were a high back, distorted breast, and long nose, were intended to give an increased zest to his witticisms; but these features have been much exaggerated in the now so well-known illustrations of the popular periodical which bears his name.

The performance of P. as generally represented, requires the assistance of only two persons—one to carry the theatre and work the figures, the other



to bear the box of puppets, blow the trumpet, and sometimes keep up the dialogue with the hero of the piece. The movements of the puppets are managed simply by putting the hands under the dress, making the second finger and thumb serve for the arms, while the forefinger works the head.

PUNCH, a beverage introduced into England from India, and so called from being usually made of five (Hindu, *pantsh*) ingredients—arrack, tea, sugar, water, and lemon-juice. As now prepared, punch may be described as a drink, the basis of which is alcohol, of one or more kinds, diluted with water, flavoured with lemon or lime-juice and spices, and sweetened with sugar; sometimes other ingredients are added according to taste, especially wine, ale, and tea. The mixture is usually compounded in a large china bowl made for the purpose, and is served out in glasses by means of a ladle. It is much more rarely seen now than formerly, which is not to be regretted, for a more unwholesome or intoxicating beverage could hardly be compounded. The ordinary mixed punch consists of the following ingredients: the juice of three lemons squeezed out into a large jug, and one lemon cut into slices, with the rind on for flavour, twelve ounces of loaf-sugar, and two quarts of boiling water; after being infused half an hour, and strained off, the liquid is poured into the punch-bowl, and half a pint of rum and of brandy are added. A favourite mode of drinking this composition at present is as a liqueur after fish at dinner, for which purpose it is bottled, and when wanted, is iced, either by placing the bottles in rough ice, or by pounding and mixing in fine ice. The principal varieties of punch, in addition to this, are rum, gin, and brandy punches, in which only one of the spirits mentioned is used, and champagne, milk, orange raspberry, tea, wine punches.

PUNCH, a tool for cutting circular or other shaped pieces out of metal, wood, or other materials. The simplest form of this instrument is shewn in fig. 1, which consists of a piece of steel

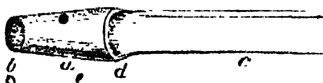


Fig. 1.

formed at one end into a hollow cylinder, *a*, the end of which at *b* is ground to a very sharp cutting edge. The other end of the punch at *c* is made strong and thick, to receive blows from a hammer, and to serve as a handle. When the instrument is in use, the cutting-edge, *a*, is applied to the surface which is to be perforated, and a blow sufficiently hard is struck on the end of the handle, *c*, when a circular piece of the material is cut out and left in the hollow part, *a*, which can be removed at the upper end of the opening at *d*. The mode of manufacturing such tools is very simple. A piece of square steel-bar is taken, the thickness of which must correspond with the thickness of the handle at *c*, fig. 1, for which fig. 2 may be taken as the

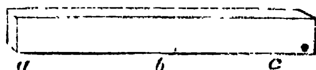


Fig. 2.

commencement. This is brought up to a sufficient heat in the furnace, and is then beaten or rolled laterally so as to have the shape in fig. 3. In the

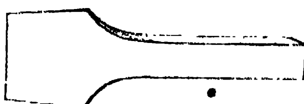


Fig. 3.

next stage, the edges, *a*, *a*, fig. 4, are brought up; and finally, a mandril is put into the groove thus made, and the edges are brought together, and welded:



Fig. 4.

the mandril is then withdrawn, and the tool goes to be ground and finished. It will be obvious that, by skill, punches may be made which will make holes of almost any shape. The enormous development of our iron manufactures has necessitated the use of machine-tools in the place of those made for the hand, and none of the very ingenious inventions for this purpose have played a much more important part than the *punching-machines*, for without them the labour of drilling holes in iron plates for such objects, as steam-boilers, iron ships, bridges, and other great works, would have been so great as to have effectually prevented them from being

undertaken. The punching-machine invented by Messrs Roberts and Nasmyth, with recent modifications and improvements, is in very general use in all our great engineering works; its essential parts are the punch, lever, and the spring. The punch is simply a piece of tough, hard steel of a cylindrical form, and of the size of the intended holes; it fits into a socket, which is suspended over a fixed iron plate or bench, which has a hole exactly under the punch, and exactly fitting it. In the socket which holds the punch is a coiled iron spring, which holds up the punch, and allows it to descend when the power is applied, and returns it when the pressure is relieved. The lever, when in action, presses on the top of the punch, and the plate of metal which is to be perforated being placed on the iron bench, receives the pressure of the punch with sufficient force to press out a disc of metal exactly the diameter of the punch, which falls through the hole in the iron bench. The lever is moved by a cam on a powerful wheel, which presses upon it until it can pass; then the lever being relieved, the punch is drawn up by the spring in its socket, ready to receive the action of the cam when the revolution of the wheel again brings it to bear on the lever. The punch itself is always solid, differing entirely in this respect from the hand-tools. This useful machine will perforate thick plates of iron, such as are used for shipbuilding, almost as quickly as a workman with an ordinary hand-punch could perforate thin plates of tin; the holes made are quite true, and are ready to receive the rivets.

PUNCTUATION, the division of a writing into sentences, and the subdivision of these into parts by means of certain marks called *points*, a great help to the clear exhibition of the meaning and to the pleasant reading of what is written. The ancients were not acquainted with the use of points, or used them very little, and only for oratorical purposes. Punctuation, according to the grammar and sense, is said to have been an invention of the Alexandrian grammarian, Aristophanes; but was so much neglected and forgotten, that Charlemagne found it necessary to ask Warnefried and Alcuin to restore it. It consisted at first of a point called the *stigma*, and sometimes a line, variously formed and introduced. The system of punctuation now in use was introduced by the Venetian printer, Manutius, in the latter part of the 15th c.; the example was soon and generally followed, and little change has since been found requisite.

PU'NDLER, the name which in Scotland used to be given to a person employed on an estate as hedger, ditcher, forester, and general guardian, in absence of the proprietor. The office of a pundler was probably analogous to that of poynder. In a few cases, the term pundler is still employed.

PU'NIC WARS, the name commonly given to the three great wars waged for supremacy between Rome and Carthage. The Latin word *punicus*, or *pœnicus*, was the name given by the Romans to the Carthaginians, in allusion to their Phœnician descent. For an outline of the struggle between the two rival powers, see CARTHAGE, ROME, HAMILCAR, HANNIBAL, and the SCIPIOS.—The Romans, who believed, not without reason, that the Carthaginians never sincerely meant to keep any treaty of peace, employed the phrase *punica fides*, 'Punic faith,' to denote a false and faithless spirit.

PU'NICA. See POMEGRANATE.

PU'NISHMENT, in this country, usually means the deprivation of property or liberty, or the infliction of pain on the body of one who commits a criminal offence. It is not applicable, generally, to civil actions, though these are also followed with the compulsory payment of money, and failing which, with the deprivation of property and liberty. As the legal consequence of crimes, punishment consists chiefly of the infliction of pain on the body, and this ranges from capital punishment or death, down to imprisonment for a term of years, and, in some cases, whipping is added; and in military and naval offences, flogging. Capital punishment is inflicted only in case of treason and murder (but there are other instances under naval or army discipline), and in the form of Hanging (q. v.). In crimes of less degree, imprisonment, or Penal Servitude (q. v.) for a term of years, is the punishment. As a general rule, the judge has a discretion to fix the punishment within two defined limits. In the great mass of the smallest crimes, which are cognisable by justices of the peace, and are frequently termed offences punishable summarily, the usual punishment is a fine or penalty, i. e., a sum of money is ordered to be paid by the offender, and if he do not pay it, his goods are sold to make up the sum; failing which, he is committed to the house of correction for a short period of 3, 6, or 12 months; but, in some of the cases, imprisonment and hard labour are imposed in lieu of a fine. The crown can put an end to a sentence of punishment by a free pardon, or may commute a sentence of death to imprisonment for life.

PUNISHMENT, FUTURE. See HELL.

PUNISHMENTS, MILITARY AND NAVAL. These, in the British service, include death, by shooting, if for an offence against discipline—or by hanging, if for a disgraceful offence; for serious crimes, flogging, not exceeding 50 lashes, inflicted with the cat-o'-nine-tails on the bare back (see FLOGGING); for minor offences, degradation of rank, imprisonment, extra drill, stoppage of grog, loss of good-conduct pay, stoppage of leave, &c. Death, degradation, and loss of leave are the only punishments of those named above which can be inflicted on an officer. An officer can only be punished by sentence of a court-martial; he may be cashiered, dismissed the service, deprived of his regiment or ship; or, in the navy, reduced in rank by being placed at the bottom of the list of officers of his grade.—In certain of the German armies, punishment is inflicted on the men in the form of strokes with a cane or with the flat of a sabre.

PU'NJAB (the *Pentapotamia* of the Greeks, derives its name from two Persian words, signifying 'five rivers') is an extensive territory in the north-west of Hindustan, watered by the Indus, and its five great affluents—the Jhelum, Chenab, Ravi, Beas, and Sutlej, and forms a British possession since February 1849. It is bounded on the W. by the Suliman Mountains, on the N. by Cashmere, and on the E. and S. E. by the Sutlej, which, in its lower course, is called the Ghara. In shape, the territory of the P. resembles an isosceles triangle, the apex of which is at the junction of the Indus and the Punjnud, in lat. about 29° N.; and the base, about 450 miles in length, runs along the Himalayas. The sides are about 600 miles in length. According to the latest returns published in the last statistical tables of the *Colonial and other Possessions of the United Kingdom* (1862), the area of the P. is 100,406 square miles; and the pop. 14,794,611. The physical character of the northern contrasts strikingly with that of the southern districts. In the north, the whole surface is traversed by spurs from the Himalayas, which enclose deep valleys. In the south, the surface is unbroken by any important eminence, with the exception of the Salt Range, about 2000 feet high, between the Indus and the Jhelum. The country, divided into five doabs,

or interfluvial tracts, and frequently spoken of as the plains of the Indus, has a general slope towards the south-west. The climate in the plains is most oppressively hot and dry in summer, indicating in Lahore 112°, in a tent artificially cooled; but cool, and sometimes frosty, in winter. Little rain falls except in the districts along the base of the Himalayas. The soil varies from stiff clay and loam to sand; but, in general, is sandy and barren, intermixed with fertile spots. The rivers afford abundant means of irrigation. The indigenous vegetation of the P. is meagre. Trees are few in number and small, and fuel is so scarce, that cow-dung is much used in its stead. With an efficient system of agriculture, however, the territories of this part of India might be rendered very productive. Of the ordinary crops, wheat of excellent quality, is produced in considerable quantities, and indigo, sugar, cotton, tobacco, opium, buckwheat, rice, barley, millet, maize, and numerous vegetables and fruits are grown. The manufacturing industry of this region is very considerable, and is carried on for the most part in the great towns, as Amritsir (q. v.), Lahore (q. v.), Multan (q. v.), &c. Spices and other groceries, dye-stuffs, cloths, metals, and hardware, are imported from the more eastern provinces of British India; and grain, ghee, hides, wool, carpets, shawls, silk, cotton, indigo, tobacco, salt, and horses are exported. The inhabitants are of various races, chiefly Jats, Gujurs, Rajputs, and Patans. Two-thirds of the whole population are Moslems, and of the remaining third, one half are Hindus, and the other half Sikhs. The Jats are the most prominent of the races of the P., and are said to have formed the 'core and nucleus' of the Sikh nation and military force. Of the history of the P., all that is important will be given under the heading SIKHS.

PU'NKAH, a gigantic fan for ventilating apartments, used in India and tropical climates. It consists of a light frame of wood, covered with calico, from which a short curtain depends, and is suspended by ropes from the ceiling; another rope from it passes over a pulley in the wall to a servant stationed without; the servant pulls the punkah backwards and forwards, maintaining a constant current of air in the chamber.

PUNT, a heavy, oblong, flat-bottomed boat, useful where stability and not speed is needed. Punts are much used for fishing. Some are fitted for oars; but the more usual mode of propulsion is by poles operating on the bottom. Punting is a very laborious exercise.

PUOZZOLA'NO. See CEMENTS.

PU'PA (Lat. a girl, or a doll), the second stage of insect life after the hatching of the egg. The first stage after the egg is that of *Larva* (q. v.). In those insects of which the metamorphosis is *complete* (see INSECTS), the pupa is generally quite inactive, and takes no food. This is the case in the *Lepidoptera*, the pupa of which is called a *Chrysalis* or *Aurelia*, and in the *Coleoptera*, *Hymenoptera*, and *Diptera*. Manifestations of life may indeed be produced by touching, or in any way irritating, the pupa, but it is incapable of locomotion and of eating. It is quite otherwise with the pupæ of other orders, which are often very voracious, and resemble the perfect insect in almost everything but that the wings are wanting. The peculiarities of the pupa are noticed in the articles on the different orders and genera of insects.

PUPIL. See EYE.

PUPIL, in the Law of Scotland, means, in the case of a male, one who is under 14 years of age, in the case of a female, one under the age of 12 years.

PU'PPET, a name (derived from the Lat. *pupus*, a child or boy, Fr. *poupée*, a doll) signifying a child-like image. The Italian *fantoccini* (from *fantino*, a child), and the French *Marionettes* (q. v.) are other names for puppets. Puppet-plays, or exhibitions in which the parts of the different characters are taken by miniature figures worked by wires, while the dialogue is given by persons behind the scenes, are of very ancient date. Figures with movable limbs have been found in the tombs of ancient Egypt and Etruria. Originally intended to gratify children, they ended in being a diversion for adults. In China and India they are still made to act dramas either as movable figures or as shadows behind a curtain ('Ombres Chinoises'). In Italy and France puppet-plays were at one time carried to a considerable degree of artistic perfection, and even Lessing and Göthe in Germany thought the subject worth their serious attention. In England, they are mentioned under the name of *Motions* by many of our early authors, and frequent allusions occur to them in the plays of Shakspeare, Ben Jonson, and the older dramatists. The earliest exhibitions of this kind consisted of representations of stories taken from the Old and New Testament, or from the lives and legends of saints. They thus seem to have been the last remnant of the *Moralities* of the 15th century. We learn from Ben Jonson and his contemporaries that the most popular of these exhibitions at that time were the *Prodigal Son*, and *Nineveh with Jonas and the Whale*. Even the Puritans, with all their hatred of the regular stage, did not object to be present at such representations. In the reign of Queen Elizabeth, puppet-plays were exhibited in Fleet Street and Holborn Bridge—localities infested by them at the period of the Restoration. The most noted exhibitions of the kind were those of Robert Powel in the beginning of the 18th century. (See Chambers's *Book of Days*, vol. ii. 167.) So recently as the time of Goldsmith, scriptural 'Motions' were common, and, in *She Stoops to Conquer*, reference is made to the display of Solomon's Temple in one of these shows. The regular performances of the stage were also sometimes imitated; and Dr Samuel Johnson has observed, that puppets were so capable of representing even the plays of Shakspeare, that *Macbeth* might be represented by them as well as by living actors. These exhibitions, however, much degenerated, and latterly consisted of a wretched display of wooden figures barbarously formed, and decorated without the least degree of taste or propriety, while the dialogues were jumbles of absurdities and nonsense.

The mechanism of puppet-plays is simple. The exhibiter is concealed above or below the stage, works the figures by means of wires, and delivers the dialogues requisite to pass between the characters. The exhibition of Punch (q. v.) is perhaps the only example of this species of acting which exists in this country at the present time.

PURÂN'A (literally 'old,' from the Sanscrit *purâ*, before, past) is the name of that class of religious works which, besides the Tantras (q. v.), is the main foundation of the actual popular creed of the Brahminical Hindus (see HINDU RELIGION under INDIA). According to the popular belief, these works were compiled by *Vyâsa* (q. v.), the supposed arranger of the *Vedas* (q. v.), and the author of the *Mahâbhârata* (q. v.), and possess an antiquity far beyond the reach of historical computation. A critical investigation, however, of the contents of the existing works bearing that name must necessarily

lead to the conclusion, that in their present form they do not only not belong to a remote age, but can barely claim an antiquity of a thousand years. The word *Purân'a* occurs in some passages of the *Mahâbhârata*, the law-books of Yâjnavalkya and Manu (q. v.); it is even met with in some *Upanishads* and the great Brâhman'a portion of the White-Yajur-Veda; but it is easy to shew that in all these ancient works it cannot refer to the existing compositions called P., and therefore that no inference relative to the age of the latter can be drawn from that of the former, whatever that may be. Nevertheless, it must be admitted that there are several circumstances tending to shew that there existed a number of works called P., which preceded the actual works of the same name, and were the source whence these probably derived a portion of their contents. The oldest known author of a Sanscrit vocabulary, Amara-Sinha, gives as a synonym of P. the word *Pancha-lakshan'a*, which means 'that which has five (*panchan*) characteristic marks' (*lakshan'a*); and the scholiasts of that vocabulary agree in stating that these *lakshan'as* are: 1. Primary creation, or cosmogony; 2. Secondary creation, or the destruction and renovation of worlds; 3. Genealogy of gods and patriarchs; 4. *Manwantaras*, or reigns of Manus; and 5. The history of the princes of the solar and lunar races. Such, then, were the characteristic topics of a P. at the time, if not of Amara-Sinha himself—which is probable—at least of his oldest commentators. Yet the distinguished scholar most conversant with the existing Purân'as, who, in his preface to the translation of the *Vishn'u-P.*, gives a more or less detailed account of their chief contents (Professor H. H. Wilson), observes, in regard to the quoted definition of the commentators on Amara-Sinha, that in no one instance do the actual Purân'as conform to it exactly: that 'to some of them it is utterly inapplicable; to others, it only partially applies.' To the *Vishn'u-P.*, he adds, it belongs more than to any other P.; but even in the case of this P. he shews that it cannot be supposed to be included in the term explained by the commentators. The age of Amara-Sinha is, according to Wilson, the last half of the century preceding the Christian era; others conjecture that it dates some centuries later. On the supposition, then, that Amara-Sinha himself implied by Pancha-lakshan'a the sense given to this term by his commentators, there would have been Purân'as about 1900 or 1600 years ago; but none of these have descended to our time in the shape it then possessed.

Various passages in the actual Purân'as furnish proof of the existence of such older Purân'as. The strongest evidence in this respect is that afforded by a general description given by the *Matsya-P.* of the extent of each of the Purân'as (which are uniformly stated to be 18 in number), including itself; for, leaving aside the exceptional case in which it may be doubtful whether we possess the complete work now going by the name of a special P., Professor Wilson, in quoting the description from the *Matsya-P.*, and in comparing with it the real extent of the great majority of Purân'as, the completeness of which, in their actual state, does not admit of a reasonable doubt, has conclusively shewn that the *Matsya-P.* speaks of works which are not those we now possess. We are then bound to infer that there have been Purân'as older than those preserved, and that their number has been 18, whereas, on the contrary, it will be hereafter seen that it is very doubtful whether we are entitled to assign this number to the actual P. literature.

The modern age of this latter literature, in the form in which it is known to us, is borne out by the change which the religious and philosophical ideas, taught in the epic poems and the philosophical Sûtras, have undergone in it; by the legendary detail into which older legends and myths have expanded; by the numerous religious rites—not countenanced by the Vedic or epic works—which are taught, and, in some Purân'as at least, by the historical or quasi-scientific instruction which is imparted, in it. To divest that which, in these Purân'as, is ancient, in idea or fact, from that which is of parasitical growth, is a task which Sanscrit philology has yet to fulfil; but even a superficial comparison of the contents of the present P. with the ancient lore of Hindu religion, philosophy, and science, must convince every one that the picture of religion and life unfolded by them is a caricature of that afforded by the Vedic works, and that it was drawn by priestcraft, interested in submitting to its sway the popular mind, and unscrupulous in the use of the means which had to serve its ends. The plea on which the composition of the Purân'as was justified even by great Hindu authorities—probably because they did not feel equal to the task of destroying a system already deeply rooted in the national mind, or because they apprehended that the nation at large would remain without any religion at all, if, without possessing the Vedic creed, it likewise became deprived of that based on the Purân'as—this plea is best illustrated by a quotation from Sâyan'a, the celebrated commentator on the three principal *Vedas*. He says (*Rigv.*, ed. Müller, vol. i. p. 33): 'Women and S'ûdras, though they, too, are in want of knowledge, have no right to the Veda, for they are deprived of (the advantage of) reading it in consequence of their not being invested with the sacred cord; but the knowledge of law (or duty) and that of the supreme spirit arises to them by means of the Purân'as and other books (of this kind).' Yet to enlighten the Hindu nation as to whether or not these books—which sometimes are even called a fifth Veda—teach that religion which is contained in the *Vedas* and *Upanishads*, there would be no better method than to initiate such a system of popular education as would reopen to the native mind those ancient works, now virtually closed to it.

Though the reason given by Sâyan'a, as clearly results from a comparison of the Purân'as with the oldest works of Sanscrit literature, is but a poor justification of the origin of the former, and though it is likewise indubitable, that even at his time (the middle of the 15th c. A.D.), they were, as they still are, not merely an authoritative source of religion for 'women and S'ûdras,' but for the great majority of the males of other castes also, it nevertheless explains the great variety of matter of which the present Purân'as are composed, so great and so multifarious indeed, that, in the case of some of them, it imparts to them a kind of cyclopædical character. They became, as it seems, the source of all popular knowledge; a substitute to the masses of the nation, not only for the theological literature, but for scientific works, the study of which was gradually restricted to the leisure of the learned few. Thus, while the principal subjects taught by nearly all the P. are cosmogony, religion, including law, and the legendary matter which, to a Hindu, assumes the value of history, in some of them we meet with a description of places, which gives to them something of the character of geography; while one, the *Agni-P.*, also pretends to teach archery, medicine, rhetoric, prosody, and grammar; though it is needless to add that that teaching has no real worth.

One purpose, however, and that a paramount one, is not included in the argument by which Sâyan'a endeavoured to account for the composition of the Purân'as—it is the purpose of establishing a sectarian creed. At the third phase of Hindu Religion (q. v.), two gods of the Hindu pantheon especially engrossed the religious faith of the masses, Vishn'u (q. v.) and S'iva (q. v.), each being looked upon by his worshippers as the supreme deity, to whom the other as well as the remaining gods were subordinate. Moreover, when the power or energy of these gods had been raised to the rank of a separate deity, it was the female S'akti, or energy, of S'iva, who, as Durgâ, or the consort of this god, was held in peculiar awe by a numerous host of believers. Now, apart from the general reasons mentioned before, a principal object, and probably *the* principal one of the Purân'as, was to establish, as the case might be, the supremacy of Vishn'u or S'iva, and it may be likewise assumed of the female energy of S'iva, though the worship of the latter belongs more exclusively to the class of works known as Tantras. There are, accordingly, Vaishn'ava-Purân'as, or those composed for the glory of Vishn'u, S'aiva-P., or those which extol the worship of S'iva; and one or two Purân'as, perhaps, but merely so far as a portion of them is concerned, will be more consistently assigned to the S'âkta worship, or that of Durgâ, than to that of Vishn'u or S'iva.

'The invariable form of the Purân'as,' says Professor Wilson, in his *Preface to the Vishn'u-Purân'a*, 'is that of a dialogue in which some person relates its contents in reply to the inquiries of another. This dialogue is interwoven with others, which are repeated as having been held, on other occasions, between different individuals, in consequence of similar questions having been asked. The immediate narrator is commonly, though not constantly, Lomaharshan'a, or Romaharshan'a, the disciple of Vyâsa, who is supposed to communicate what was imparted to him by his preceptor, as he had heard it from some other sage. . . . . Lomaharshan'a is called Sûta, as if it was a proper name; but it is, more correctly, a title; and Lomaharshan'a was "a Sûta," that is, a bard or panegyrist, who was created, according to the *Vishn'u-Purân'a*, to celebrate the exploits of princes, and who, according to the *Vâyu* and *Padma Purân'as*, has a right, by birth and profession, to narrate the Purân'as, in preference even to the Brahmans.'

The number of the actual Purân'as is stated to be 18, and their names, in the order given, are the following: 1. *Brahma-*; 2. *Padma-*; 3. *Vishn'u-*; 4. *S'iva-*; 5. *Bhâgavata-*; 6. *Nâradîya-*; 7. *Mârkan'd'eya-*; 8. *Agni-*; 9. *Bhavishya-*; 10. *Brahmavaivartta-*; 11. *Linga-*; 12. *Varâha-*; 13. *Skanda-*; 14. *Vâmana-*; 15. *Kûrma-*; 16. *Matsya-*; 17. *Garud'a-*; and 18. *Brahmân'da-Purân'a*. In other lists, the *Agni-P.* is omitted, and the *Vâyu-P.* inserted instead of it; or the *Garud'a* and *Brahmân'da* are omitted, and replaced by the *Vâyu* and *Nr'isinha Purân'as*. Of these Purân'as, 2, 3, 5, 6, 10, 12, 17, and probably 1, are Purân'as of the Vaishn'ava sect; 4, 8, 11, 13, 15, 16, of the S'aiva sect; 7 is, in one portion of it, called Devîmâhâtmya, the text-book of the worshippers of Durgâ; otherwise, it has little of a sectarian spirit, and would therefore neither belong to the Vaishn'ava nor to the S'aiva class; 14, as Professor Wilson observes, 'divides its homage between S'iva and Vishn'u with tolerable impartiality; it is not connected, therefore, with any sectarial principles, and may have preceded their introduction.' The *Bhavishya-P.* (9), as described by the *Matsya-P.*, would be a book of prophecies; but the *Bhavishya-P.* known to Professor Wilson consists of five books, four of which are dedicated to the gods Brahmâ, Vishn'u, S'iva, and Twashtr'i; and the same scholar doubts whether this work could have any claim to the name of a P., as its first portion is merely a transcript of the words of the first chapter of Manu, and the rest is entirely a manual of religious rites and ceremonies. There are similar grounds for doubt regarding other works of the list.

If the entire number of works, nominally, at least, corresponding with those of the native list, were taken as a whole, their contents might be so defined as to embrace the five topics specified by the commentators on the glossary of Amara-Sinha; philosophical speculations on the nature of matter and soul, individual as well as supreme; small codes of law; descriptions of places of pilgrimage; a vast ritual relating to the modern worship of the gods; numerous legends; and, exceptionally, as in the *Agni-P.*, scientific tracts. If taken, however, individually, the difference between most of them, both in style and contents, is so considerable that a general definition would become inaccurate. A short description of each P. has been given by the late Professor H. H. Wilson, in his preface to his translation of the *Vishn'u P.*; and to it, as well as to his detailed account of some Purân'as in separate essays (collected in his works), we must therefore refer the reader who would wish to obtain a fuller knowledge of these works.—The age of the P., though doubtless modern, is uncertain. The *Bhâgavata*, on account of its being ascribed to the authorship of the grammarian Vopadeva, would appear to yield a safer computation of its age than the rest; for Vopadeva lived in the 12th c., or, as some hold, 13th c., after Christ; but this authorship, though probable, is not proved to a certainty. As to the other Purân'as, their age is supposed by Professor Wilson to fall within the 12th and 17th centuries of the Christian era, with the exception, though, of the *Mârkan'd'eya-P.*, which, in consideration of its unsectarian character, he would place in the 9th or 10th century. But it must be borne in mind that all these dates are purely conjectural, and given as such by the scholar whose impressions they convey.

Besides these eighteen Purân'as or great Purân'as, there are minor or *Upapurân'as*, 'differing little in extent or subject from some of those to which the title of Purân'a is ascribed.' Their number is given by one Purân'a as four; another, however, names the following 18: 1. *Sanatkumâra-*; 2. *Nârasinha-*; 3. *Nâradîya-*; 4. *S'iva-*; 5. *Durvâsa-*; 6. *Kâpila-*; 7. *Mânava-*; 8. *Aus'anasa-*; 9. *Vârun'a-*; 10. *Kâlikâ-*; 11. *S'âmba-*; 12. *Nandi-*; 13. *Saura-*; 14. *Pârâs'ara-*; 15. *Âditya-*; 16. *Mâhes'wara-*; 17. *Bhâgavata-* (probably, however, a misreading for *Bhârgava*); and 18. *Vâs'ishtha-Upapurân'a*. Another list, differing from the latter, not in the number, but in the names, of the Upapurân'as, is likewise given in Professor Wilson's *Preface to the Vishn'u-Purân'a*. Many of these Upapurân'as are apparently no longer procurable, while other works so called, but not included in either list, are sometimes met with; for instance, a *Mudgala* and *Ganes'a* Upapurân'a. The character of the Upapurân'as is, like that of the Purân'as, sectarian; the *S'iva-Upapurân'a*, for instance, inculcates the worship of S'iva, the *Kâlikâ-Upapurân'a* that of Durgâ or Devî.

Both Purân'as and Upapurânas are for a considerable portion of their contents largely indebted to the two great epic works, the *Mahâbhârata* (q. v.) and *Râmâyan'a* (q. v.), more especially to the former of them. Of the Purân'as, the original text of three has already appeared in print: that of the *Bhâgavata* in several native editions, published at Bombay, with the commentary of S'ridharaswâmin, and

partly in a Paris edition by Eugène Burnouf, which remained incomplete through the premature death of that distinguished scholar; that of the *Mârkan'd'eya-P.*, edited at Calcutta in the *Bibliotheca Indica*, by the Rev. K. M. Banerjea; and that of the *Linga-P.*, edited at Bombay; for, regarding a fourth, the *Garud'a-P.*, edited at Benares and Bombay, it seems doubtful whether that little work is the same as the P. spoken of in the native list. Besides these, small portions from the *Padma, Skanda, Bhavishyottara, Mârkan'd'eya*, and other Purân'as have been published in India and Europe. Of translations, we have only to name the excellent French translation by Burnouf of the first nine books of the *Bhâgavata*, and the elegant translation of the whole *Vishn'u-P.*, together with valuable notes by the late Professor H. H. Wilson, which is now in the course of republication in his works, in a new edition, amplified with numerous notes, by Professor F. E. Hall.—For general information on the character and contents of the Purân'as, see especially Wilson's preface to his translation of the *Vishn'u-P.* (Works, vol. vi., Lond. 1864), Burnouf's preface to his edition of the *Bhâgavata* (Paris, 1840), Wilson's *Analysis of the Purân'as* (Works, vol. iii. Lond. 1864, edited by Professor R. Rost), K. M. Banerjea's *Introduction to the Mârkan'd'eya* (Calcutta, 1862), and John Muir's *Original Sanscrit Texts on the Origin and History of the People of India*, vols. 1—4 (Lond. 1858—1863).

PU'RBECK, Isle of, a district in the south of Dorsetshire, 14 miles in length from west to east, and 7 miles in breadth, is bounded on the N. by the river Frome and Poole Harbour, on the E. and S. by the English Channel, and on the W. by the stream of Luckford Lake, which, rising in the park of Lulworth Castle, flows north, and joins the Frome. On the west, however, the water-boundary is not complete, the district being connected with the main portion of the county at East Lulworth; and the so-called Isle of P. is therefore really a peninsula. In ancient times, the Isle of P. was a royal deer-forest. See Purbeck Beds and Purbeck Marble.

PURBECK BEDS, a group of strata forming the upper members of the Oolitic Period (q. v.), and so named because they are well developed in the peninsula called the Isle of Purbeck (q. v.), south of Poole Estuary in Dorsetshire. They are, like the Wealden beds above them, chiefly fresh-water formations; but their organic remains join them more closely to the marine-formed Oolites below, than to the superior Wealden series. Though of a very limited geographical extent, the Purbeck beds have yet considerable importance, from the changes in animal life that took place during their deposition. Generally less than 200 feet in thickness, they, however, exhibit three distinct and peculiar sets of animal remains. This has caused them to be arranged into three corresponding groups, known as the Upper, Middle, and Lower Purbecks.

The Upper Purbecks are entirely fresh-water, and the strata are largely charged with the remains of shells and fish; the cases of the Entomostraca Cyprides are very abundant and characteristic. The building-stone called Purbeck Marble belongs to this division.

The Middle Purbecks record numerous changes during their deposition. The newest of the strata consists of fresh-water limestone, with the remains of Cyprides, turtles and fish. This rests on brackish water-beds—Cyrena with layers of Corbula and Melania. Below this, there are marine strata, containing many species of sea-shells. Then follow some fresh and brackish-water limestone and shales, which again rest on the cinder-bed, a marine argillaceous deposit, containing a vast accumulation of the shells of a small oyster. This is preceded by fresh-water strata, abounding in the remains of Entomostraca, and containing some beds of cherty limestone, in which little bodies, believed to have been the spore-cases of species of Chara, have been found. At the base of this sub-group, a marine shale occurs, containing shells and impressions apparently of a large Zostera.

The Lower Purbecks begin with a series of fresh-water marls, containing Entomostraca and shells. These rest on strata of brackish-water origin; and then follows a singular old vegetable soil, containing the roots and stools of Cycads, and the stems of coniferous trees. From its black colour and incoherent condition, this layer has received from the quarrymen the name of the 'Dirt-bed' (q. v.). This rests on the basement bed of the whole group, which is a fresh-water limestone, charged with Entomostraca and shells, and contains the thin layer in which Mr Beckles has lately found the remains of several species of mammalia.

PURBECK MARBLE is an impure fresh-water limestone, containing immense numbers of the shells of Paludina, from which it derives its 'figure' when polished. It was formerly much used in the internal decoration of churches and other buildings in the southern counties of England. It is quarried in the peninsula of Purbeck, in Dorsetshire, and belongs to the upper section of the Purbeck Beds (q. v.).

PURCELL, Henry, the most eminent of English musicians, was born at Westminster in 1658, and was son of Henry Purcell, one of the gentlemen of the Chapel-royal appointed at the Restoration. He lost his father at the age of six, and was indebted for his musical training to Cook, Humphreys, and Dr Blow. His compositions at a very early age shewed evidence of talent. In 1676, he was chosen to succeed Dr Christopher Gibbons as organist of Westminster Abbey; and in 1682 he was made organist of the Chapel-royal. He wrote numerous anthems and other compositions for the church, which were eagerly sought after for the use of the various cathedrals, and have retained their place to the present day. P.'s dramatic and chamber compositions are even more remarkable. Among the former may be mentioned his music to the *Tempest*, his songs in Dryden's *King Arthur*, his music to Howard's and Dryden's *Indian Queen*, to Urfey's *Don Quixote*, &c. A great many of his cantatas, odes, glees, catches, and rounds are yet familiar to lovers of vocal music. In 1683, he composed twelve sonatas for two violins and a bass. P. studied the Italian masters deeply, and often made reference to his obligations to them. In originality and vigour, as well as harmony and variety of expression, he far surpassed both his predecessors and his contemporaries. His church music has been collected and edited from the original MS. by Mr Vincent Novello, in a folio work which appeared in 1826—1836, with a portrait and essay on his life and works. He died of consumption in 1695, and was buried in Westminster Abbey.

PURCHASE-SYSTEM, a highly unpopular and much misunderstood arrangement in the British army, by which a large proportion—probably a half—of the first appointments of officers and their subsequent promotion is effected. It dates from the first formation of an English standing army, and was formally recognised in the reign of Queen Anne. The system itself is very simple. A price is fixed by regulation for each substantive rank (see Promotion), viz.—

	Price.	Difference.
Lieutenant-colonel, ...	£4500	£1300
Major, ...	3200	1400
Captain, ...	1800	1100
Lieutenant, ...	700	250
Cornet or Ensign, ...	450	

When any officer holding one of these regimental commissions desires to retire from the army, he is entitled to sell his commission for the price stipulated in the above table—£4500, in the case of a lieutenant-colonel. This sum is made up by the senior major, who is willing and able to purchase, buying the rank of lieutenant-colonel for £1300; the senior captain, willing and able to purchase, buying a majority for £1400; a lieutenant purchasing his company for £1100; a cornet or ensign becoming lieutenant on payment of £250; and lastly, by the sale to some young gentleman of an ensigncy or cornetcy for £450. In practice, fancy prices higher than the above are often given, according to the popularity of a regiment, but this is only *sub rosâ*. The value of commissions in the Guards is also greater; but as they constitute but a few regiments, and are mostly officered from the nobility, they do not need particular description.

No commission can be purchased by one officer unless another officer vacates his commission by its sale. Death-vacancies, vacancies caused by augmenting a regiment, vacancies resulting from the promotion of colonels to be major-generals, are filled without purchase, usually by seniority. No rank above lieutenant-colonel can be purchased.

It is alleged with truth that purchase enables the rich man to step over the head of the poorer, but perhaps better qualified, non-purchasing officer; and that money decides where merit should be the only guide. These disadvantages, however, it is replied, are not unmixed. Purchase, it is argued, introduces into the army men of a very high class in society, who give a tone to the whole of military life. A great proportion of these wealthy men enter with the intention of merely spending a few years in the army, and then selling out. This tends, among other things, to keep the officers young—a great advantage; and, further, provides in the country, among its gentlemen, a body of men accustomed to military life, who prove themselves well adapted for commands in the militia and volunteers. Moreover, selection exercised arbitrarily, as it must be when the men from whom the selection is to be made are scattered all over the world away from the selecting power, would be certain to create dissatisfaction, and would probably be substantially unfair. If seniority were the rule, officers could scarcely change from one regiment to another; but under purchase, exchange is a common thing, and is the greatest boon to the poor officer who holds to his original corps, for the rich officers, for private reasons of locality, &c., are glad to change frequently from regiment to regiment, entering in each case at the *bottom* of the list of officers of their rank in their new regiment. This, of course, pushes the non-exchanging officer to the top, and the first death or other non-purchase promotion then falls to him. An officer who has not purchased at all, may nevertheless sell his commission for its full value if he has served twenty years, or for a sum less than the regulated price after shorter service. This is also a spur to promotion. On the whole, though exposed to the disadvantage and annoyance of being passed over by younger officers, the non-purchasing, i.e., the poor officers benefit by the purchase-system. This is proved by the slow progress officers make in corps where purchase does not exist, as, for instance, in the Royal Marines. Few would counsel the formation of a new army with such a system as purchase; but, on the other hand, it has its advantages in its working; and, now once established, would be most difficult to extinguish. The estimated cost of buying out existing rights of sale is calculated at from £3,000,000 to £5,000,000. Purchase does not exist in the artillery, engineers, marines, 19th to 21st regiments of cavalry, or 101st to 109th regiments of foot, and is in process of abolition in the military train.

PURCHASER. See Sale.

PU'RFLED, or PURFLEWED, in Heraldry, a term used with reference to the lining, bordering, or garnishing of robes, or ornamentation of armour.

PURGA'TION. See Ordeal.

PU'RGATIVES are medicines which, within a definite and comparatively short time after exhibition, produce the evacuation of the bowels. The remedies included under this head have, however, various modifications of action, which adapt them for the fulfilment of different therapeutic applications. They are divided by Pereira into five groups, viz.:

1. *Laxatives.*—A purgative is said to be laxative when it operates so mildly as merely to evacuate the intestines without occasioning any general excitement of the system, or any extraordinary increase of watery secretion from the capillaries of the alimentary canal. This group includes manna, sulphur, cassia pulp, castor oil, &c.; and purgatives of this kind are employed when we wish to evacuate the bowels with the least possible irritation, as in children and pregnant women; in persons suffering from hernia, piles, stricture or prolapsus of the rectum, &c.

2. *Saline* or *Cooling Purgatives*, such as sulphate of magnesia, and potassio-tartrate of soda, either in simple solution, or in the form of Seidlitz Powder (q. v.). They give rise to more watery evacuations than the members of the preceding group, and are much employed in inflammatory and febrile cases.

3. *Milder Acrid Purgatives*, such as senna, rhubarb, and aloes. They possess acrid and stimulating properties, and are intermediate in activity between the last and the next group. Senna (generally in the form of Black Draught) is employed when we want an active but not very irritant purgative. Rhubarb is especially adapted for patients when there is a want of tone in the alimentary canal. Aloes is used in torpid conditions of the large intestine; but as this drug irritates the rectum, it should be avoided in cases of piles and of pregnancy, especially if there is any threatening of miscarriage.

4. *Drastic Purgatives*, such as jalap, scammony, gamboge, croton oil, colocynth, and elaterium, when swallowed in large doses, act as irritant poisons, and are employed in medicine when the bowels have resisted the action of milder purgatives, or when we wish to exert a powerful derivative action upon the intestinal mucous membrane (as in cases of apoplexy, when croton oil is commonly used), or when it is necessary to remove a large quantity of water from the system, as in dropsical affections, in which case, elaterium, from its hydragogue power, is usually employed.

5. *Mercurial Purgatives*, the chief of which are calomel, blue pill, and gray powder. They are commonly given with the view of increasing the discharge of bile, although their power in this respect has recently been denied. As their action is uncertain, they are usually combined with or followed by other purgatives. Podophyllin (q. v.) has recently been much used for the purpose of exciting bilious evacuations. Hamilton's book *On Purgative Medicines*, which was published more than half a century ago, is still the standard work on the subject of this article.

PU'RGATORY (Lat. *purgatorium*, from *purgo*, I cleanse) is the name given, in the Roman Catholic

and oriental churches, to a place of purgation, in which, according to their religious system, souls after death either are purified from venial sins (*peccata venalia*), or undergo the temporal punishment which, after the guilt of mortal sin (*peccata mortalia*) has been remitted, still remains to be endured by the sinner. The ultimate eternal happiness of their souls is supposed to be secured; but they are detained for a time in a state of purgation, in order to be fitted to appear in that Presence into which nothing imperfect can enter. As there is some obscurity and much misunderstanding on this subject, we shall briefly explain the doctrine of Catholics, as collected from authentic sources, distinguishing those things which are held by them as 'of faith,' from the opinions which are freely discussed in their schools. Catholics hold as articles of their faith (1) that there is a purgatory in the sense explained above, and (2) that the souls there detained derive relief from the prayers of the faithful and from the sacrifice of the mass. The Scriptural grounds alleged by them in support of this view are 2d Macc. xii. 43–46 (on which they rely, not merely on the supposition of its being inspired, but even as a simple historical testimony), Matt. xii. 32, 1st Cor. iii. 11–15, 1st Cor. xv. 29; as well as on certain less decisive indications contained in the language of some of the Psalms—as xxxvii. (in Auth. Vers. xxxviii.) 1, and lxv. 12. And in all these passages they argue not alone from the words themselves, but from the interpretation of them by the Fathers, as containing the doctrine of a purgatory. The direct testimonies cited by Catholic writers from the Fathers to the belief of their respective ages as to the existence of a purgatory, are very numerous. We may instance among the Greeks: Clement of Alexandria, *Stromata*, vii. 12; Origen, *Hom.* xvi. c. 5, 6 *in Jeremiam*; vi. *Hom. in Exod.*; xiv. *Hom. in Levit.*; xxviii. *Hom. in Numb.*; Eusebius, *De Vita Constantini*, iv. 71; Athanasius, *Quæst.* xxxiv. *ad Antioch.*; Cyril of Jerusalem, *Cat. Mystag.* v. 9; Basil, *Hom. in Psalm*, v. 7; Gregory of Nazianzen, xli. *Orat. de Laude Athanasii*; Gregory of Nyssa, *Orat. de Bapt.*; as also Epiphanius, Ephrem, Theodoret, and others. Among the Latins: Tertullian, Cyprian, Arnobius, Lactantius, Hilary, Ambrose, and above all, Augustine, from whom many most decisive passages are cited; Paulinus of Nola; and Gregory the Great, in whom the doctrine is found in all the fulness of its modern detail. The epitaphs of the catacombs, too, supply Catholic controversialists with some testimonies to the belief of a purgatory, and of the value of the intercessory prayers of the living in obtaining not merely repose, but relief from suffering, for the deceased; and the liturgies of the various rites are still more decisive and circumstantial. Beyond these two points, Catholic faith, as defined by the Council of Trent, does not go; and the council expressly prohibits the popular discussion of the 'more difficult and subtle questions, and everything that tends to curiosity, or superstition, or savours of filthy lucre.' Of the further questions as to the nature of purgatory, there is one of great historical importance, inasmuch as it constitutes one of the grounds of difference between the Greek and Latin churches. As to the existence of purgatory, both these churches are agreed; and they are further agreed that it is a place of suffering; but, while the Latins commonly hold that this suffering is 'by fire,' the Greeks do not determine the manner of the suffering, but are content to regard it as 'through tribulation.' The decree of union in the Council of Florence (1439) left this point free for discussion. Equally free are the questions as to the situation of purgatory; as to the duration of the purgatorial suffering; as to the probable number of its inmates; as to whether they have, while there detained, *a certainty* of their ultimate salvation; and whether a 'particular judgment' takes place on each individual case immediately after death.—See Bellarminus, *De Purgatorio*; Suaresius, *De Purgatorio*; and on the Greek portion of the subject, Leo Allatius, *De utriusque Ecclesiæ in Dogmate de Purgatorio perpetuâ Consensione.*

The mediæval doctrine and practice regarding purgatory were among the leading grounds of the protest of the Waldenses and other sects of that age. The Reformers as a body rejected the doctrine.

What is called the 'historical' or critical view of its genesis, is well given by Neander (*Dogmengeschichte*, vol. i.). He conceives that its source is to be sought for in the ancient Persian doctrine of a purifying conflagration which was to precede the victory of Ormuz, and consume everything that was impure. From the Persians it passed with modifications to the Jews, and from them found its way into the ethical speculations of the more cultivated Christians. It harmonised admirably with the wide-spread philosophical notion borrowed by the Gnostic Christians from Neo-Platonism, that matter is inherently evil. If then the *body* was to rise, it must be purged of evil, and the instrument of purification—fire, was at hand for the purpose. Moreover, the high and pure conception of the character of God revealed in the New Testament, necessitating a corresponding moral excellence on the part of his worshippers—'without holiness shall no man see the Lord'—must have greatly assisted in the establishment of the doctrine, for how could men, only lately gross heathens, possessing yet but the rudiments of the new faith, and with most of their heathen habits still clinging about them, be pronounced 'holy' or 'fit for the presence of God?' Their 'faith' in Christ was sufficient to save them, but the work of sanctification was incomplete when they died, and must go on. Probably it was a strong Christian feeling of this sort that determined the reception of the doctrine of purgatory into the creed of the Catholic church, rather than any Gnostic philosophisings, though the Neo-Platonic divines of Alexandria are the first to mention it.

Protestants generally reply to the arguments of Roman Catholics on the subject of purgatory, by refusing to admit the authority of tradition or the testimonies of the Fathers, and at the same time by alleging that most—if not all—of the passages quoted from the Fathers, as in favour of purgatory, are insufficient to prove that they held any such doctrine as that now held by the Roman Catholic Church, some of them properly relating only to the subject of prayer for the dead, and others to the doctrine of Limbus (q. v.). That the doctrine of purgatory is the fair development of that which maintains that prayer ought to be made for the dead, Protestants generally acknowledge, but refuse to admit that the Fathers carried out their views to any such consequence. As to the alleged evidences from Scripture, they are commonly set aside by Protestants as merely ridiculous. The much vaunted argument from the second book of Maccabees, is of course contemned, as being from an apocryphal book, and not one of the best books of the Apocrypha; besides, that the passage relates to nothing more than prayer for the dead. The text Matt. xii. 32, is explained as relating to the final judgment; and 1 Cor. iii. 11—15, as relating to a trial of *works*, and not of persons; whilst 1 Cor. xv. 29 is regarded as having nothing more to do with the subject than any verse taken at random from any part of the Bible.

PURGING NUT. See PHYSIC NUT.

PURIFICATION, in a Biblical sense, is the act through which an individual became fit to approach the Deity, or to mix freely in the community, in cases where a certain bodily or other disability had kept him out of the pale of the latter. The purification consisted chiefly in expiations, ablutions, sometimes accompanied by special sacrifices. Priests and Levites were consecrated for the Divine service by 'purification;' proselytes had to undergo it at baptism; and special religious acts could only be performed by those who had 'bathed their bodies.' Generally, no one was allowed to enter the Temple or synagogue without having washed or 'sanctified' himself; and in the post-exilian period, bathing was considered (chiefly by the Pharisees and Essenes) as one of the chief duties of piety. In general, the Mosaic Law distinguishes between 'clean' and 'unclean' persons as well as things, calling 'unclean' all that with which an Israelite is not to come in contact. It has been erroneously assumed that all the Levitical laws of purity and purification have a physical or medical reason—that is, that infection was to be prevented through them; but this can only have been the case in some instances. At the same time, we cannot deny that we are at a loss for the general principle on which they were based. There can be no doubt that cleanness, like every other virtue, if not enforced on religious grounds, would have had few devotees in those days, and among an eastern people; while, again, a hot climate requires a much greater attention to outward purity than more temperate zones. Compared with the Indian and Persian laws in this respect, the Jewish ones seem much less minute and harassing. For the purification from the severer kinds of uncleanness, a certain 'water of uncleanness' (Lev. xv.) was prepared; and the different acts to be performed for the readmission of the leper into the community (Lev. xiv. 4—32), shew plainly that his was considered the last stage of impurity. Identical with the first stage of the leper's purification are the ceremonies to be performed in the case of infected houses and garments. The sixth Seder of the Mishnah, in 11 treatises (there is no Gemara to this portion, except to Niddah), contains the most detailed regulations (as fixed by tradition) on this point. The washing of hands, we may add in conclusion, was in later times considered ritually necessary, in accordance with the Talmudical maxim, that 'every table should properly be sanctified into an altar.' See UNCLEANNESS.

All the Jewish ceremonial purifications are commonly regarded by Christian theologians as emblematic of the necessity of holiness in the people of the Lord, and particularly in all acts of worship.

PURIFICATION OF THE BLESSED VIRGIN MARY, FEAST OF, a festival in commemoration of the 'purification' of the Blessed Virgin Mary, in accordance with the ceremonial law of Lev. xii. 2. This ceremony was appointed for the fortieth day after childbirth, which, reckoning from December 25 (the Nativity of our Lord), falls upon February 2, on which day the purification is celebrated. The history of Mary's compliance with the law is related in Luke ii. 22—24; and as on the same occasion she complied also with the law of Numb. xviii. 15, by the offering prescribed in redemption of the first-born, the festival is also called by the name of the 'Presentation of the Child Jesus,' or the 'Feast of Simeon,' and sometimes, also, 'of the Meeting' (*occursus*), in allusion to Simeon's meeting the Virgin mother, and taking the child into his arms (Luke ii. 25). The date of the introduction of this festival is uncertain. The first clear trace of it is about the middle of the 5th c., during the reign of Marcia, and in the Church of Jerusalem. Its introduction in the Roman Church in 494, was made, by Pope Gelasius, the occasion of transferring to a Christian use the festivities which at that season were annexed to the pagan festival of the Lupercalia.

PU'RITANS, a name first given, according to Fuller, in 1564, and according to Strype, in 1569, to those clergymen of the Church of England who refused to conform to its liturgy, ceremonies, and discipline as arranged by Archbishop Parker and his Episcopal coadjutors. But in point of fact, the Puritan tendency in the Church of England is as old as the church itself; and to seek for its true origin we must go back to the period of Cranmer, who, when laying the foundations of English Protestantism in a nation only half-prepared for the change, found it necessary to make concessions to the older religion, and to build the new church on an elaborate system of compromise. This feature of 'Anglicanism'—its essential *broad-churchism*—gave great offence to the stricter and more doctrinal of the English reformers, who neither cared nor were competent to look at the thing from a statesman's point of view. The reign of Edward VI., brief though it was, shewed quite clearly that if the party in the English Church who had acquired not only their theology, but their opinions of church-government from Calvin, ever got the upper hand, they would not stop till they had reconstructed, on a much simpler basis, the whole ecclesiastical fabric. The reaction under Mary drove most of them to seek safety in exile on the continent. It was here the first definite step in the history of Puritanism was taken. A number of the exiles resident at Frankfurt determined to adopt the Genevan service-book in preference to that appointed by King Edward, and though their attempt proved a failure, partly on account of the opposition of others of the exiles, yet it shewed the pertinacity with which they tried to carry their convictions into practice. On their return to England, after the accession of Elizabeth, the struggle was renewed. But the virile queen would not tolerate their notions, and during her whole reign, punished in the most stringent style all who refused to obey the Episcopal ordinances. The position assumed by the P. was that the liturgy, ceremonies, and discipline of the Church of England required further reformation; that the church, as then constituted, did not separate itself markedly enough from Roman Catholicism; and that it was desirable, in the interests of religion, to abandon everything that could boast of no other authority than tradition or the will of man, and to follow as far as possible the 'pure' word of God. Hence their name, which was probably given in derision. In spite of the sharpest repressive measures, their principles gradually spread among the serious portion of the laity, who were also called Puritans. But the name appears not to have been confined to those who wished for certain radical changes in the forms of the church. The character that generally accompanied this wish led naturally enough to a wider use of the term; hence, according to Sylvester, 'the vicious multitude of the ungodly called all Puritans that were strict and serious in a holy life, were they ever so conformable.' This is the sense in which the Elizabethan dramatists use the word. From this very breadth of usage, one sees that there were different degrees of Puritanism. Some would have been content with a moderate reform in the rites, discipline, and liturgy of the church; others (like Cartwright of Cambridge) wished to abolish Episcopacy altogether, and to substitute Presbyterianism; while a third party, the Brownists or Independents (q. v.),

were out-and-out dissenters, opposed alike to Presbyterianism and Episcopacy. During the reigns of James I. and Charles I., the spirit of Puritanism continued more and more to leaven English society and the English parliament, although the most violent efforts were made by both monarchs to extirpate it. The tyrannical proceedings of Laud and of the Laudian bishops, and the outrages practised by Charles on the English constitution, led many who were not at all Genevah in their ideas to oppose both church and king for the sake of the national liberties. Hume distinguishes three kinds of P.: 1. The *Political P.*, who disliked the bishops, not so much on ecclesiastical grounds, as on account of their servility towards the king, and their priestly antipathy to civil liberty; 2. The *P. in Church Discipline*, who were for the most part in favour of Presbyterianism; 3. The *Doctrinal P.*, who were strong Calvinists on such points as predestination, free-will, grace, &c., but were not opposed to Episcopacy or to the ecclesiastical authority of the monarch, and who contented themselves with assailing the Arminianism that was encouraged at court. The attitude of this third class was certainly anomalous, and it is not wonderful that they exercised so little influence or control on the march of events in the great civil struggle. The second class was by far the most numerous—at least among the clergy; and at first it seemed as if the clergy were going to have things all their own way. For example, in the memorable 'Westminster Assembly of Divines' (1643), the great majority of the ministers were Presbyterians, and their *Confession of Faith* is quite a Presbyterian affair. But genius, energy—the arms of victory—belonged to the more advanced P., who were predominant in the army and the parliament, and ultimately triumphed in the person of Cromwell (q. v.). But the Restoration (1660) brought back Episcopacy, and the Act of Uniformity (1662) threw the P. of the church into the position of dissenters. Their subsequent history is treated under the different forms of dissent. Before the civil war broke out, so great were the hardships to which the P. were exposed, that many of them emigrated to America, to seek liberty and peace on the solitary shores of the New World. There they became the founders of the New England States, and cultivated unmolested that form of Christianity to which they were attached. Nowhere did the spirit of Puritanism in its evil as well as its good more thoroughly express itself than in Massachusetts and Rhode Island; nor have its traces wholly disappeared even yet. In Scotland, Puritanism, in the shape of Presbyterianism, was from the first the established religion; hence it does not present itself to us in that country as a struggling, suffering, antagonistic, and protesting force; nor, in point of fact, was the name of P. ever given even to the extremest sect of Covenanters.—See Neale's *History of the Puritans*; Price's *History of Protestant Nonconformity in England*; and Macaulay's *History of England*.

PURL, a beverage now little used except among the lower classes in and around London. It is made by warming a pint of ale with a quarter of a pint of milk, and adding some sugar and a wine-glassful of gin, rum, or brandy.

PU'RLINS, pieces of timber used in framed roofs, between the principals, for the support of the common rafters.

PU'RMEREND, a flourishing little town in North Holland, 10 miles north of Amsterdam, and on the line of the great canal from that city to the North Sea. Pop. nearly 5000. It has a large trade in cheese, butter, eggs, cattle, and wood, upwards of 1,600,000 lbs. of cheese being annually sold in the market. In 1862, the number of ships which entered amounted to 138, having an aggregate burden of 36,235 tons, 7 belonging to the Netherlands, and 131 to foreign ports, 127 being timber-laden. The town, which sprung up under the protection of the castle of Purmerstein (built at the beginning of the 15th c.), derives its name from being situated at the end of the Purmer, formerly a sheet of water, by drainage made a fertile tract of land containing 6701 acres.

PU'RNEAH, a large town of British India, capital of an extensive and populous district of the same name in the presidency of Bengal, on the north bank of the Ganges, stands on both banks of the Little Kosi river, 230 miles north-north-west of Calcutta. It covers a considerable area, but it is not compactly built, there being numerous plantations, gardens, and other open places within the boundaries. Around the town are numerous straggling villages. A considerable quantity of indigo is grown in the vicinity. The civic establishment consists for the most part of Europeans. Pop. from 40,000 to 50,000.

PURPLE OF CASSIUS, or **GOLD PURPLE**, a beautiful colouring material of a vitreous character, which was made known in Germany in the 17th c. by an artist named Andrew Cassius, whose father was secretary to the Duke of Schleswig. Its property is to give a beautiful ruby red to glass, and it was therefore, and still is, employed to make imitation rubies. It is made by combining one part of neutral chloride of gold with a mixture of one part of protochloride and two parts of perchloride of tin, all in solution. When mixed together, a beautiful purple precipitate is the result, which is the Purple of Cassius. The French recipe, which is said to be the best, is 10 parts of acid chloride of gold dissolved in 2000 parts of distilled water. To this add a solution, carefully prepared, in another vessel, of 10 parts of pure tin in 20 parts of muriatic acid diluted with 1000 parts of water. On mixing the two, the purple precipitate is thrown down, and is separated by filtering and decantation.

PURPLE COLOURS. Painters in oil and water colours produce the various shades of purple by the admixture of pure red and pure blue colours. Dyers obtain this colour from various sources, all of which are curious and interesting. From a very early period, purple has been one of the most highly prized of all colours, and came to be the symbol of imperial power. Probably one great reason for this was the enormous cost of the only purple colour known to the ancients, the Tyrian purple, which was obtained in minute quantities only from a Mediterranean species of molluscous animal or shell-fish, the *Murex trunculus*, and perhaps also *Purpura lapillus*. In the time of Cicero, wool double-dyed with this colour was called *dibapha*, and was so excessively dear, that a single pound-weight cost a thousand denarii, or about £35 sterling. A single murex only yields a small drop of the secretion, consequently very large numbers had to be taken in order to obtain enough to dye even a small amount of wool. Tarentum, the modern Otranto, was one of the great murex fisheries of the Romans, and there they had a number of large dyeing establishments. Vast heaps of the shells have been discovered there, the remains of its former industry. With the decline of the Roman empire, the employment of this purple colour ceased, and it was not until a Florentine of the name of Orchillini discovered the dyeing properties of the lichen now called Orchella Weed, that a simple purple colour was known in Europe.

The discovery was kept secret in Italy for nearly a century, and that country supplied the rest of Europe with the prepared dye, which received the name of Orchil or Archil (q. v.). The colour was very fugitive, and soon ceased to be used by itself; it, however, was found very useful in combination, and has a remarkable power of brightening up other colours. Many improvements have been lately made in archil dyeing, especially in fixing it. Its value, however, has been greatly lessened by the discovery of the beautiful series of purples yielded by coal-tar as results of the combination of one of its products called aniline with other bodies. See DYEING.

PURPLE EMPEROR (*Apatura Iris* or *Nymphalis Iris*), one of the largest of British butterflies, and one of the most richly coloured. The expanse of wings is from 2½ to 3¼ inches. The wings are strong and thick, and the flight more sustained



Purple Emperor (larva and pupa shewn below).

than that of many butterflies. The P. E. is very often to be seen about the tops of oak-trees.

PURPLE WOOD, or **PURPLE HEART**, the heart-wood of *Copaifera pubiflora* and *C. bracteata*, a very handsome wood of a rich plum colour. The trees producing it are natives of British Guiana, where the wood is called generally *Mariwayana*. The trees are rather rare on the coast, but in the upland forests are common. The chief interest of the wood is its remarkable adaptation to the purposes of artillery and fire-arms. It is said no wood is better adapted for mortar-beds and gun-carriages, as it sustains better than any other the violent concussions to which they are subjected. Its chief use in this country has been for making ramrods for muskets. Its great beauty and smooth grain would insure its extensive employment in cabinet-work in this country, if it were better known.

PURPLES. See EAR-COCKLES.

PU'RPURA, a genus of gasteropodous molluscs, of the family *Buccinidæ*. The species are very similar to those of the genus *Buccinum* (see WHELK), but have a less elongated shell, and a flattened columella, which is pointed at the base, and forms there, with the outer lip, a canal excavated as a notch in the shell, and not projecting. The species are numerous, mostly natives of the shores of warm climates. *P. lapillus* is a species pretty common on most parts of the British coast. It is smooth and whitish, with bands of reddish-brown, and sometimes two inches long. It feeds on mussels and other molluscs, boring their shells with its proboscis. The genus is interesting, because some species of it were amongst



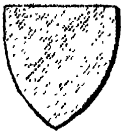
Purpura:
Shell of *P. persica*; an animal of *P. hæmostoma*.

those which yielded the famous *Tyrian purple* of the ancients. *P. patula* is supposed to have been one of those from which this dye was obtained, but it may have been obtained from others, as *P. lapillus*. The dye is contained in a small vein-like sac near the head. See PURPLE COLOURS.

PURPURA, or **THE PURPLES**, is a malady which is often erroneously placed amongst the diseases of the skin. It is in reality a blood disease, and is characterised by the appearance of small round spots, of a deep purple colour, which are seen first and most abundantly on the legs, and afterwards extend to the arms and trunk. They are accompanied by no local pain, are not effaced by pressure (being due to a drop of blood extravasated beneath the cuticle, or in the structure of the skin itself), do not rise above the surrounding surface, and are sometimes intermixed with livid patches resembling bruises; and, before disappearing, both the round spots and the patches undergo the same change of colour which a bruise undergoes. These spots are not peculiar to the skin, but occasionally occur upon internal surfaces, and in the tissues of viscera. Passive hæmorrhages from the mucous membranes frequently accompany the external symptoms. There is usually much debility, and often a great tendency to faintness. The duration of the disease varies from a few days to a year or more. Slight cases are devoid of danger, and even the hæmorrhagic cases usually recover, unless the bleeding has been excessive, or the blood has been extravasated into a vital organ.

The causes of this disease are obscure. The mode of treatment varies in different cases, but the main indication always is to correct the condition of the blood. When there is reason to believe that the disease is dependent upon depressing influences, a nutritious diet, tonics, and stimulants are required; and chalybeates, or the mineral acids, and quinine, with plenty of exercise in the open air, should be prescribed. When, however, there is no evidence of the operation of any debilitating cause, and the pulse is hard, the most efficient treatment consists in abstinence, venesection, and purgatives. In cases of a mixed nature, a mixture of the oil of turpentine and castor-oil, in free doses (2 drachms of the former to 5 or 6 drachms of the latter), and iced drinks, or the sucking of small pieces of ice, have been strongly recommended. If the hæmorrhage is not stopped by the oil of turpentine, gallic acid, or acetate of lead and opium, must be prescribed; and if it proceeds from accessible parts, local measures, such as the employment of ice or strong astringents, should also be employed.

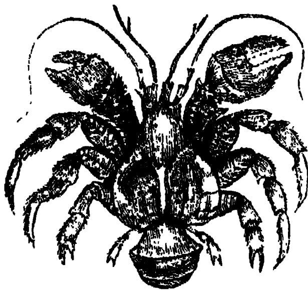
PU'RPURE, in Heraldry, the colour purple, expressed in engravings by lines in bend sinister. It is of unfrequent occurrence in British heraldry.


Purpure.

PU'RPURINE. See MADDER.

PURRE. See DUNLIN.

PURSE-CRAB (*Birgus*), a genus of *Crustacea*, of the order *Decapoda*, and suborder *Anomoura* (see CRAB), allied to Hermit-crabs (q. v.), but having the abdomen or *tail* shorter and almost orbicular, its under surface soft and membranous, its upper surface covered with strong plates, which overlap one another as in lobsters. The first pair of legs have large and powerful pincers; the pair of legs nearest the abdomen are very small, but terminated by rudimentary pincers; the pair next to them larger, with small pincers; the second and third pair of legs are terminated by a single nail. A species of P. (*B. latro*) is found in Mauritius and in the more eastern islands of the Indian Ocean. It is one of the largest of crustaceans, sometimes two or three feet in length when fully stretched out, and


Purse-crab (*Birgus latro*).

capable of erecting itself to the height of a foot from the ground, which it readily does if irritated, retreating backward, and exhibiting to the utmost its powers of offence or defence. It is of a yellowish-brown colour, its limbs covered with little blackish projections. It is never found far from the sea, to which it is said to pay visits, in order to moisten its gills; but it resides on land, and often in holes under the roots of trees, where it accumulates great quantities of the fibres of the cocoa-nut husk, as if to keep itself warm, or for a soft bed. The Malays rob these stores to supply themselves with junk. The gills of the P. are contained in a very large cavity, of which they fill only a very small part. Its food consists of cocoa-nuts and other nuts, which it climbs trees to procure. Its manner of dealing with a cocoa-nut is described as exhibiting a remarkable instinct, as it always begins to tear off the husk at the end where the *eyes* are. It is variously stated that it makes a hole through the eye from which the nut would germinate, and then scoops out the nut with the small pincers of its fourth pair of legs; and that having made this hole, it seizes the nut by one of its great pincers, and breaks it against a stone. Both statements may perhaps be true.

PU'RSER, in the Royal Navy, was formerly a warrant, and subsequently a commissioned officer, in charge of the provision, clothing, pay, and necessaries of a ship-of-war. His title was changed in 1844 to that of Paymaster (q. v.).

PU'RSLANE (*Portulaca*), a genus of plants of the natural order *Portulaceæ*, having a bifid calyx, 4 or six petals, 8 or 16 stamens, and a capsule dividing around the middle. COMMON P. (*P. oleracea*) grows in cultivated and waste grounds on the sea-shore, in almost all tropical and subtropical parts of the world. It is cultivated as a pot-herb. It is a short-lived annual, with spreading and rather procumbent stems, and obovate, fleshy leaves, which, as well as the young shoots, are frequently used in salads. The young and tender shoots are pickled in France like gherkins. P. is not so common in British gardens as it once was.

PU'RSUIVANT (Fr. *poursuivant*, follower), the third and lowest order of heraldic officers. The office was instituted as a novitiate, or state of probation through which the office of herald and king-at-arms were ordinarily to be attained, though it has been held that a herald or king-at-arms may be made *per saltum*. There are four pursuivants belonging to the English College of Arms: *Rouge Croix*, the oldest, so named from the Cross of St George; *Blue-mantle*, instituted either by Edward III. or Henry V., and named in allusion to the robes of the Order of the Garter, or perhaps to the colour of the arms of France; *Rouge Dragon*, deriving his title from King Henry VII.'s dexter supporter, a red dragon, assumed in allusion to his descent from Cadwaladyr; and *Portcullis*, named from a badge of the same monarch. There are six pursuivants in the heraldic establishment of Scotland, known by the names of *Dingwall*, *Bute*, *Carrick*, *Ormond*, *Kintyre*, and *Unicorn*—titles which, as well as those of the heralds, seem to have originated in the reign of James III. The Scottish pursuivants take precedence according to seniority in office.

In ancient times, any great nobleman might institute his own pursuivant with his own hands and by his single authority. The Dukes of Norfolk had a pursuivant, called *Blanch-lyon*, from the white lion in their arms; the pursuivant of the Dukes of Northumberland was styled *Espérance*, from the Percy motto; and Richard Nevil, Earl of Salisbury, had a pursuivant called *Egle vert*. We even find Sir John Lisle, in 1442, making Thomas de Launcy his pursuivant, by the title of *Blanch Sanglier*. The ancient costume of a pursuivant of the king was a surcoat, embroidered with the royal arms, and worn with one sleeve hanging down in front, and another behind. In 1576, Rouge Croix was severely censured for wearing his coat as a herald. In later times, however, a pursuivant's coat is worn exactly as a herald's, the latter officer being distinguished by the collar of SS.

PURŪRAVAS, a celebrated legendary king of ancient India. According to tradition, he was a son of the planet Budha, or Mercur, by Ilā—a name of the earth, a prince renowned for liberality, devotion, magnificence, truthfulness, and personal beauty; but still more so on account of his love for the Apsaras Urvas'ī. This heavenly nymph having incurred the imprecation of some gods, and therefore having been compelled to descend from heaven, saw P., and was seen by him. The king having, in consequence, fallen in love with Urvas'ī, she consented to return his affection, on the condition that he would never suffer two rams, which she loved as children, and always kept near her bedside, to be carried away from her, and also that he should never be seen by her undressed. To these terms the king gave his assent; but the Gandharvas, the choristers in Indra's heaven, and the husbands of the Apsarasas, being jealous of P., instigated one of their tribe to carry away one of the rams during the night; and after he had accomplished their design, other Gandharvas came and stole the second ram. Upon this P., highly incensed, and trusting that the nymph would not see his person, as it was

dark, rose in pursuit of the robbers. At that moment, however, the Gandharvas caused a flash of lightning to irradiate the scene, and Urvas'î beheld the king undressed. The compact was violated, and Urvas'î disappeared, while the Gandharvas, abandoning the rams, departed to the sky. P. recovered the animals, but could find Urvas'î nowhere. Like one insane, the king now wandered over the world, until he saw her, at Kurukshetra, sporting with four other nymphs of heaven in a lake beautified with lotuses. Urvas'î, however, told him to keep away from her until, at the end of the year, she should be delivered of the son with whom she was pregnant by him. He obeyed; and after Âyus was born, these annual interviews between P. and Urvas'î were repeated, until she had born him five other sons—Dhîmat, Amâvasu, Vis'wâvasu, S'atâyus, and S'rutâyus. But the king, now longing for an uninterrupted re-union with his wife, Urvas'î endeavoured to propitiate the Gandharvas who had caused their separation. Her efforts were successful; and they taught the king how to produce by attrition, from the wood of the fig-tree, a sacrificial fire, and how to divide it into the three fires required for sacrificial acts. By this means, they enabled him then to celebrate many sacrifices; and, by virtue of these, to be transferred to the sphere where Gandharvas and Apsarasas dwell together. This legend is adverted to in the Vedas, and related with more or less detail in the *Mahâbhârata* and the *Purân'as* (see, for instance, Wilson's *Vishn'u-Purân'a*); it is likewise the subject of the celebrated drama of Kâlidâsa, the *Vikramorvas'î*, where, however, the incidents that, according to the *Purân'as*, cause the separation of P. and Urvas'î, are not mentioned by the poet, her disappearance being ascribed by him to a fit of jealousy, in which she trespassed on the proscribed bounds of a divine hermitage. It deserves notice, too, that, in the drama, Urvas'î is transformed into a creeper, and discovered in that condition by P., when franticly roaming in search of her in the forest of Akalusha—a transformation pointing to some affinity between this latter myth and that of Daphne when pursued by Apollo.—The idea, however, on which the original Hindu myth is based—apart from the semi-historical and fantastical detail by which it was overgrown—seems to have been suggested by the (supposed) motion or wanderings (Purûravas, from *puru*, much, and *ravas*, going—from *ru*, go, move) of the sun (*Gandharva*, in the Vedas, also being a personification of the fire of the sun), attracting or absorbing, and thus uniting, as it were, with the vapours floating in the sky (*Apsaras*—from *ap*, water, and *saras*, going, arising, hence 'water-born'—being originally 'personifications of the vapours which are attracted by the sun, and form into mists or clouds;' see Goldstücker's *Sanskrit Dictionary*, under 'Apsaras;' and Urvas'î, from *uru*, large, wide, and *as'*, pervade, hence 'the far-pervading'—being identified in one passage of the *Mahâbhârata* with the river Ganges). A Greek myth of a kindred character is that of Apollo and Daphne, and also that of *Io*, according to the ingenious interpretation of it by Professor P. W. Forchhammer, in the *Verhandlungen der Versammlung deutscher Philologen in Frankfurt*, 1862. In his *Hellenica*, the same scholar has moreover shown that, in Greek mythology, the ram is a symbol of the cloud.

PURVEY'ORS, Army, are officers charged with superintending the civil affairs of army hospitals, as the payment of men, procuring provisions, medical comforts, bedding, &c. The purveyor acts independently of the medical officer, and is responsible through the purveyor-in-chief to the Secretary of State for War. The department consists (1864) of 1 purveyor-in-chief, sitting at the War Office, 10 principal purveyors, 20 purveyors, 30 deputy-purveyors, and 26 purveyors' clerks. A purveyor-in-chief has £547 per annum, rising to £730 after long service. He ranks with a colonel in the army. All ranks above clerks hold commissions. The total annual cost of the *personnel* of the purveyors' department is £23,743.

PUS is a well-known product of inflammation, and occurs as a thick yellow creamy fluid, differing from all other morbid exudations in containing a large number of corpuscles, having a soft and fatty feeling when rubbed between the fingers, a peculiar odour, usually an alkaline reaction, and a specific gravity of about 1·032. Like the blood, it consists of certain definite microscopic elements, and of an intercellular fluid or serum in which they swim.

The microscopic elements are: 1. The pus-corpuscles, which, both in their microscopical and chemical relations, seem to be identical with the lymph-corpuscles, or colourless blood-cells; in diameter, they range from 0·004 to 0·005 of a line, and each corpuscle consists of a cell-wall, which often appears granular, of viscid transparent contents, and of a nucleus which is adherent to the cell-wall, and which can be rendered much more apparent by the addition of acetic acid. 2. Molecular granules, and 3. Fat-globules. The serum of pus is perfectly clear, of a slightly yellow colour, and coagulates on heating into a thick white mass.

The chemical constituents of P. are water (varying from 769 to 907 in 1000 parts), albumen (from 44 to 180); fats (from 9 to 25); extractive matter (from 19 to 29); and inorganic salts (from 6 to 13); in addition to which, mucin, pyin, glycin, urea, &c., are occasionally present. Of the inorganic or mineral constituents, the soluble salts are to the insoluble in the ratio of 8 to 1, and the chloride of sodium (the chief of the soluble salts) is three times as abundant as in the serum of the blood. The mode of formation of pus is described in the article SUPPURATION.

PUSEY, Rev. Edward Bouverie, D.D., Regius Professor of Hebrew at Oxford, and Canon of Christ-church, a celebrated English divine, and one of the chief promoters of the High Church movement in the Church of England. He is the second son of the Honourable Philip Bouverie (younger brother of the first Earl of Radnor, who assumed the name of P.), by Lady Lucy Sherard, eldest daughter of Robert, fourth Earl of Harborough. He was born in the year 1800, was educated at Eton, and thence proceeded to Christ-church, where he obtained a first class in Classics in 1822, and gained the university prize for a Latin essay in 1824. He was afterwards elected Fellow of Oriel; and in 1828, succeeded Dr Nicoll in the Regius Professorship of Hebrew, to which a canonry at Christ-church is annexed.

Dr P.'s first publication was on the *State of Religion in Germany*, the result of a visit to that country, which appears to have greatly influenced his subsequent course, and led him to devote himself to resist the progress of Rationalism. In 1835, he became a contributor to the *Tracts for the Times* (in union with Messrs J. H. Newman, Keble, Williams, &c.), of which Nos. 67, 69, *On Holy Baptism*, and Nos. 18 and 66, *On the Benefit of Fasting*, were written by him (see TRACTARIANISM). He was also one of the editors of the *Library of the Fathers*, and of the *Library of Anglo-Catholic Theology*. In consequence of a sermon on *The Holy Eucharist, a Comfort to the Penitent*, preached before the university in 1843, he was

suspended from preaching by the Vice-chancellor for three years, on the allegation that his language on the subject of the Real Presence was beyond what is sanctioned by the Formularies of the Church of England. Dr P., however, protested against the proceeding, and appealed to the teaching of English divines. His other principal works are—*Remarks on the Benefits of Cathedral Institutions;* two treatises on the *Royal Supremacy in Spiritual Matters;* a treatise on the *Ancient Doctrine of the Real Presence: Letters to the Archbishop of Canterbury, the* (late) *Bishop of Oxford, and the* (late) *Bishop of London, in Defence of Church Principles; On Marriage with a Deceased Wife's Sister; On the Use of Private Confession in the English Church;* Translations of several foreign devotional works adapted to the use of the English Church; a *Commentary on the Minor Prophets,* now in progress; *Lectures on the Prophet Daniel;* a *Catalogue of Arabic MSS. in the Bodleian Library;* and numerous sermons.

PUSHKIN, Alexander Sergeivitch, a Russian poet of good family, was born at Moscow, 26th May 1799, and educated at the imperial lyceum of Tsarskoe Selo, where he acquired more reputation for his liberal opinions than for his attention to study. In 1817, he entered the service of government, and soon became one of the most prominent figures in fashionable society. In 1820, he published his romantic poem of *Ruslan and Liudmila,* which met with a flattering reception from the public. The incidents are laid in the legendary times of Vladimir, the Russian Charlemagne. During the next five years, P. led a roving sort of life, in the course of which appeared his *Plennik Kavkaskoi* (Prisoner of the Caucasus, 1822), which narrates the escape of a young Russian from a Circassian horde by the help of a Circassian maid; and his *Fountain of Bakhtchiserai* (1824), a poem of singular beauty and interest. These were followed by *Tzigani* (The Gipsies, 1827), a picture of wild gipsy life in Bessarabia, and *Evgenii Onagin* (1828), a humorously sarcastic description of Russian society—after the fashion of Byron's *Beppo.* In 1829, he published his last narrative poem, *Pultava,* which has for its hero Mazeppa, the famous Hetman of the Cossacks. About the same time, he wrote a dramatic poem entitled *Boris Godunov,* one of the best of all his works; but subsequent to this he appears to have addicted himself almost wholly to prose. Another, and less commendable change, however, took place in him. From being or seeming an enthusiastic 'liberal,' he passed—after his appointment to the office of imperial historiographer, with a pension of 6000 rubles—to the extreme of Russian conservatism. The chief thing he did in his official capacity was to write the life of the rebel Pugatschew. He was mortally wounded in a duel, and expired at St Petersburg, January 29 (February 10), 1837. P. is reckoned the finest poet that Russia has produced in the present century. His countrymen call him the 'Russian Byron,' and he has not a little of the bold and brilliant genius of his prototype, excelling like him in vigour of imagery and impassioned sentiment.

PU'STULAR DISEASES. Under this head are included the cutaneous diseases which are characterised by *pustules,* or circumscribed elevations of the cuticle, containing pus; they are Ecthyma, Impetigo, Acne, and Sycosis, all of which are noticed in special articles. Pustules also occur in small-pox, and occasionally in chicken-pox, but these are on good grounds regarded as febrile diseases, in which the eruption on the skin is not the primary disorder. Boils (q. v.), although not included under the head of 'pustular diseases,' are in their nature pustular.

PU'TCHUK, an aromatic root, a considerable article of commerce in India, where it is used both as a perfume and as a medicine, and of export to China, where it is much used for incense, as it gives out a very pleasant odour when burned. It appears to be the *Costus* (q. v.) of the ancients, and is the root of *Aucklandia costus,* one of the *Compositæ,* and not, as was once supposed, of a species of *Costus,* one of the *Scitamineæ.* It grows in Cashmere, and is called *Kooth* in Northern India. P. is its name at Calcutta.

PU'TLOGS, small timbers used in the construction of buildings. They lie between the wall and the poles of the scaffolding, and on them the floor of the scaffolding rests. Apertures called 'putlog-holes' are common in buildings of all ages.

PUTREFA'CTION is the term applied to the spontaneous decomposition of organic substances, when such decomposition is accompanied by an offensive odour. In other respects, it may be regarded as identical with Fermentation (q. v.). In the process of putrefaction, organic compounds of a higher order are resolved into lower organic compounds, into inorganic compounds (such as water, ammonia, sulphuretted hydrogen, &c.), or into simple chemical elements (such as hydrogen or nitrogen. The substances which most readily putrefy are the protein bodies (albumen, fibrine, caseine, &c.) and gelatigenous tissues, glue, &c.; the only necessary conditions being the presence of moisture and the access of air at the commencement of the process. Since animals are mainly composed of the protein bodies, they are especially liable to undergo this change; but many vegetable products, which are rich in these bodies (e. g., seeds), are also prone to this form of decomposition. The peculiar smell is readily accounted for when the nature of the resulting compounds is considered.

The putrefaction of organic matters is prevented by a variety of conditions, amongst which may be mentioned (1) exclusion of air, (2) perfect dryness, (3) a freezing temperature (as, e. g., in the case of the mammoths preserved in the Siberian ice), (4) a high temperature (about 250°), and (5) antiputrescent or antiseptic substances of various kinds. It is worthy of notice that all bodies susceptible of putrefactive decomposition may act as ferments, and may thus induce special changes in sugar, urea, &c., which would not have occurred except in the presence of the putrefying matter

PUTRID FEVER. See Jail Fever.

PUTTING TO SILENCE, in the Law of Scotland, is the title of a suit or action of declarator, the object of which is to put an end to certain pretended claims of marriage. The most recent illustration of this action was that in Yelverton *v.* Yelverton. The suit corresponds to what is called in England a suit of Jactitation (q. v.).

PUTTY, a composition of *whiting* and *drying* oil worked into a thick paste. It is used by painters and glaziers—by the former for filling up holes in surfaces, previous to their being painted with oil-colours; and by the latter, for fixing panes of glass in windows, &c. It becomes remarkably hard in time, and fixes the glass immovably. This has been found rather an evil in some cases, especially where thick plate-glass is used for skylights and other roofing purposes, because it will not permit the expansion and contraction caused by the varying temperature to which the glass is exposed in such situations. Hence the addition, in such cases, has been made lately of a pound of fine Russian

tallow to every twelve pounds of the ordinary putty materials. This prevents its becoming extremely hard, and insures a certain amount of elasticity.

PUTTY-POWDER, a material, consisting of peroxide of tin, in great use for polishing stone and metal-work. It is also used as a colouring material for white glass, and for the white enamels of porcelain, &c. It is made by melting tin; as the surface oxidises, the scum, which is the peroxide, is raked off, and when cold, is reduced to a fine powder, which is white in colour, and the particles are extremely hard.

PUY is the name commonly given in the highlands of Auvergne and the Cevennes to the truncated conical peaks of extinct volcanoes. It is perhaps connected with *puit* or *puits*, 'a well' or 'vent,' and may have been given in allusion to the craters of these mountains.

PUY, LE, or LE PUY-EN-VELAY, a town of France, department of Haute-Loire, about 70 miles south-west of Lyon, is one of the most picturesque towns in Europe. It stands on the steep southern slopes of Mount Anis, from the summit of which starts up precipitously the huge basaltic mass called *Rocher de Corneille*, crowned by the ruins of an ancient episcopal castle. The greatest natural curiosity is the *Rocher de St Michel*, an obelisk of nature's own making, composed of basaltic tufa, and rising in a solitary abrupt cone from the margin of the river Borne to a height of 265 feet, with a circumference at its base of 500 feet, and at its top, of from 45 to 50 feet. The sides of this 'sugar-loaf' are almost perpendicular; but a winding stair cut along the rock conducts to the summit, which is surmounted by a little Romanesque chapel of the 10th century. The most notable buildings of Le P. are the cathedral, a splendid but heavy-looking structure of the 10th or 11th c., situated in the highest part of the town, and chiefly remarkable for a wonder-working image of the Virgin (*Notre Dame du Puy*). For more than 100 years, the town has furnished the carriers and muleteers of Southern France with the bells for their horses and mules. Pop. 14,560.

PUY-DE-DOME, a large central department of France, containing an area of 5070 sq. m., and a population of 576,409. Plateau and mountain occupy three-fourths of it; plain and valley the rest. Branches of the Cevennes and of the Auvergne mountains overspread the east and west of the department. The multitude of conical hills or puys, of basaltic and lava masses, and of craters, shews the volcanic nature of the soil. See AUVERGNE. The principal river is the Allier (a tributary of the Loire), which flows in a northern direction through the middle of the department; but there are numerous lesser streams. The soil is, in general, light and poor; but its volcanic character fosters vegetation; and the splendid valley of Limagne, upwards of 70 miles long, is fertile throughout, and well cultivated. The climate is uncertain; the mountains are tormented with howling storms, and more or less covered with snow for six or seven months of the year. The chief products are wheat, rye, flax, fruits (especially cherries and nuts). Some middling wine is also produced. The high pasture-lands support great numbers of cattle, sheep, and goats. The principal minerals are iron, antimony, and lead. Hot and cold mineral springs are abundant; among the most frequented are those of St Myon and Chateldon. The department is subdivided into the arrondissements of Ambert, Clermont, Issoire, Riom, and Thiers.

PUZZOLA'NA, a mineral substance, produced by volcanoes, and abundant in volcanic countries. It derives its name from Puzzuoli near Naples. It is earthy in character, consisting of particles in a very loose state of aggregation, but its chemical composition agrees with that of Basalt (q. v.). It is found of various colours—brown, yellow, reddish, and gray. Brown and yellow are the ordinary colours of the P. of Italy. See CEMENTS.

PYÆ'MIA (from the Gr. *pyon*, pus, and *hæma*, blood), or purulent infection of the blood, is a disease, whose exciting cause is the introduction of decomposing animal matter into the circulation. The animal matter may be decomposing pus, unhealthy secretions, putrid fluid (as from decomposing hides, dead bodies, &c.), the fluid of glanders, &c.; and it may be introduced through an ulcer or a wound, through an imperfectly closed vein (see PHLEBITIS and PUERPERAL FEVER), or through a mucous membrane, as that which lines the nostrils. The poison in these cases, if it acts at all, is rapidly absorbed and diffused, and the blood undergoes certain changes, the nature of which chemistry has as yet failed to detect. Within twenty-four hours, in very acute cases, there are severe shiverings, headache, and giddiness, followed by heat, perspiration, and accelerated circulation. In twenty-four hours more, the patient may be in a hopeless condition, delirious, and rapidly sinking. In less acute cases, the symptoms closely resemble those of typhoid fever, and in this form, the disease is a common cause of death, after surgical operations. It is only, however, when there are *predisposing causes* that the poison acts so severely. By their presence, they convert a comparatively slight local mischief into infection of the whole mass of the blood; while by their absence, they render the poisonous matter comparatively harmless. Mr Callender, whose essay on pyæmia is the most complete that has yet appeared (for the recognition of the disease by a special name is comparatively recent), signalises as the chief predisposing causes—previous illness; extreme prostration or exhaustion of the system from organic disease, from surgical complaints, or from difficult parturition; unhealthy occupations; over-indulgence in food, &c.

In association with the general symptoms which have been already stated, there are often local or secondary complications.

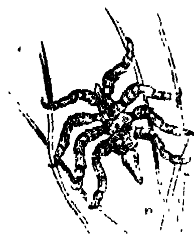
The disease is always accompanied with great danger. When secondary complications are present, the hope of recovery is very small. 'Practical surgeons,' observes Mr Callender, 'acknowledge that very little chance remains for the patient who, after an operation, is attacked with symptoms of this disease.' The only disease with which this disorder can be confounded is typhoid fever.

If the poison has been received into the system by an open sore, nitrate of silver should be applied freely, after which the part should be treated with soothing fomentations or poultices. The bowels should be freely acted on by a sharp purgative (as five grains of calomel and a scruple of jalap). The action of the skin should be increased by diaphoretics, and the bowels should be daily acted on by saline draughts, with the addition of bicarbonate of potash to stimulate the kidneys. By these means, the poison may be eliminated. The depression of the nervous system, which is usually very marked, must be counteracted by opium in small and repeated doses, in addition to which, a dose of Dover's Powder (ten grains) should be taken at bed-time. Stimulants, such as brandy and sherry, should be given in small but frequently-repeated doses from almost the beginning of the disease, and light nutritious food should be given as freely as the stomach

will bear it. The internal administration of hyposulphite of soda and of the hyposulphites generally, has been lately recommended by Professor Polli of Milan.

Considering that pyæmia is the cause of death in 10 per cent. of *all* cases of amputation, and in 43 per cent. of *all fatal* primary amputations, it becomes a question of great importance how it can be prevented. Persons whose health is already broken down require careful preparation before undergoing an operation. 'They must be strengthened,' says Mr Callender, 'by tonics, such as quinine and iron; and their secretions must be set right by appropriate alteratives; this treatment must be continued for a considerable period; for if the health be much broken, it is slow of taking effect, and its employment for only a few days prior to an operation is of course simply useless. The diet should at the same time be attended to; and persons of intemperate habits should be accustomed to a more healthy mode of living, although in no case should the stimulants be too suddenly withdrawn.' On the same principles, after the operation has been performed, these patients must have their strength supported by a nutritious diet; must have stimulants freely given them, if there are any signs of incipient prostration; and should take opium in sufficient doses to quiet the system and allay irritation.

PYCNOGO'NIDÆ, a very remarkable family of *Crustacea*, of the section *Edentata* of Milne-Edwards, and forming the order *Araneiformes* (Spider-like) of some authors. By Cuvier and many other naturalists, a place was assigned them among *Arachnida;* and it is only of late that they have been decidedly referred to *Crustacea*, in consequence of the discovery that they undergo metamorphoses. They are all marine, and some of them live among algæ, or are to be found under stones on the beach, whilst others are dredged from deep water. They seem to prey by suction on molluscs, but probably on many kinds of marine animals. The legs of many, as in the genus *Pycnogonum*, are furnished with hooks for taking hold, and Linnæus believed *P. littorale* to be parasitic on whales; but it is not uncommon among sea-weeds on the British coasts. The suctorial proboscis of these creatures may be said to form the whole head. The abdomen is almost rudimentary. Their most remarkable characteristic is in their digestive cavity. The stomach gives off from its circumference ten long cæca, four of which on each side extend into the proper or locomotive legs, the other two into the pincer-like rudimentary foot-jaws. These ramifications of the alimentary canal seem to serve all the purposes of the circulatory, respiratory, and chyliferous systems of higher animals. This arrangement, which appears also among the inferior tribes of some other classes of animals, has received from M. de Quatrefages the name of *Phlebenterism* (Gr. vein-intestineism). The stomach of the P. with its cæca floats almost freely within the general cavity of the body in a fluid, which is kept in agitation by the movements of the limbs.


Pycnogonum littorale.

PY'CNOSTYLE. See INTERCOLUMNIATION.

PY'GMIES (Gr. *pygmē*, a measure—from the elbow to the hand), a fabulous race of dwarfs in whose existence the ancients believed. Homer says that every spring they were attacked by the cranes on the coasts of Oceanus. Later writers place them at the mouths of the Nile, but we also read of northern Pygmies inhabiting the region of Thule, and of Pygmies who lived in subterranean dwellings on the eastern side of the Ganges. Greek fancy worked hard to paint the Lilliputian dimensions of these creatures. It was said that they cut down every corn-ear with an axe; that when Hercules came into their country, they climbed up his goblet, by the help of ladders, to drink from it; and that, when he was asleep, two whole Pygmy armies fell upon his right, and another on his left, hand, but were all rolled up by the hero in his lion's skin. Aristotle did not believe that the stories about Pygmies were utterly fabulous, however much they had been overlaid by fancy with the marvellous. His 'rationalistic' (if not rational) interpretation was, that they were probably some diminutive tribe in Upper Egypt, who rode very small horses, and lived in caves.

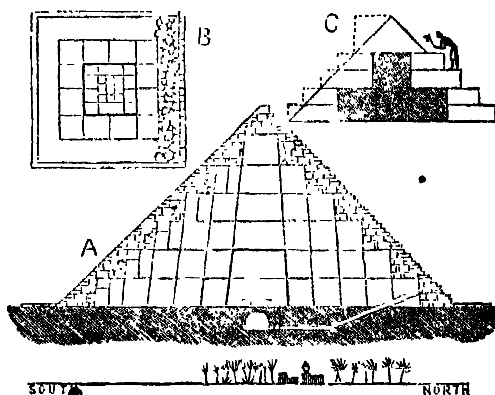
PYM, JOHN, famous as the leader of the popular party in the House of Commons in the reign of Charles I., was born in the year 1584. He came of a good family in Somersetshire, and was proprietor of the lands of Woolavington Pym and Woolavington Throckmorton, near Bridgewater, in that county. He was for some years a gentleman-commoner of Pembroke College, Oxford, and afterwards studied law at one of the Inns of Court. Having been sent to parliament as member for Tavistock, in Devonshire, he attached himself to the popular party; and, during the later part of the reign of James I., became noted for his vigorous opposition to the arbitrary measures of the court. In 1626, the year after the accession of Charles I., he distinguished himself by taking a prominent part in the impeachment of the king's favourite, the Duke of Buckingham. In 1640, the functions of parliament having been in abeyance for 13 years, during which time the popular discontents had gradually been growing to a head, the celebrated Long Parliament was convened; and from the first, P. was by common consent recognised in it as the leader of the opposition to the despotic policy of the monarch. For the position which he thus occupied, his qualifications were eminent. In temper, he was bold and fearless; he was master of an eloquence, close, terse, and vigorous; and in knowledge of parliamentary form and business procedure, it was considered he had scarcely his equal in the House. On November 3, as soon as business had opened, he set forth to the House, in a long and elaborate address, the intolerable grievances under which the nation laboured; and a week after, he boldly denounced the Earl of Strafford as the 'great promoter of tyranny,' to whose evil influence on the mind of the king these grievances were in the main to be attributed. In the impeachment of Strafford which followed, resulting in his execution under a bill of attainder passed upon him, Pym took the leading part. Of this master-stroke of policy, which deprived the king of the one man of resolute temper and powerful genius who adhered to his cause, the credit must be chiefly awarded to Pym. In the subsequent proceedings against Laud, he was also conspicuous, as in every other crisis of moment, up to the time when war became inevitable between the king and the parliament. On the breaking out of hostilities, he remained at his post in London, and in the exercise of the functions of the executive there rendered services to the cause not less valuable and essential than those of a general in the field. While the strife was yet pending, he died somewhat suddenly at Derby House, on December 8, 1643, having been appointed to the

important post of Lieutenant of the Ordnance only the month previous. He was buried at Westminster Abbey with great pomp on the 13th; and in token of grief for the great parliamentary leader, was borne to his last resting-place by six members of the House of Commons. The House of Commons also voted £10,000 in payment of his debts.

PYRACA'NTHA. See CRATÆGUS.

PY'RAMID, in Geometry, is a solid figure, of which the base is a plane rectilinear figure, and the sides are triangles, converging to a point at the top or 'apex.' Pyramids, like prisms, are named from the form of their bases; thus, a pyramid having a triangle for its base is a triangular pyramid, with a square base, a square pyramid, with any four-sided figure for its base, a quadrangular pyramid; or it may be pentagonal, hexagonal, &c. Pyramids may be either 'right' or 'oblique.' See PRISM. A right pyramid, with an equilateral figure for its base, has all its sloping edges equal; but this is not the case if the pyramid be oblique. The most remarkable property of the pyramid is, that its volume is exactly one-third of that of a prism having the same base and vertical height; and it follows from this, that all pyramids having the same base and height are equal to each other.

PYRAMID, a structure of the shape of the geometric figure so called, erected in different parts of the Old and New World, the most important being the Pyramids of Egypt and Mexico. Those of Egypt were considered one of the seven wonders of the world, are seventy in number, of different sizes, are between 29° and 30° N. lat., and are masses of stone or brick, with square bases, and triangular sides. Although various opinions have prevailed as to their use, as that they were erected for astronomical purposes, for resisting the encroachment of the sand of the desert, for granaries, reservoirs, or sepulchres, the last-mentioned hypothesis has been proved to be correct in recent times by the excavations of the late General Howard Vyse, who is said to have expended nearly £10,000 in investigating their object and structure. They were all the tombs of monarchs of Egypt who flourished from the fourth to the twelfth dynasty, none having been constructed later than that time; the subsequent kings being buried at Abydos, Thebes, and other places, in tombs of a very different construction. The meaning of the word pyramid is involved in great obscurity; although attempts have been made to derive it from the Coptic *piharam*, yet, as in the hieroglyphs it is found in connection with the words *ben ben* or *ber ber*, forms of the Coptic *beebe mahou*, or tomb, and *abmer*, or sepulchre, it is probably an ancient Greek word. The Pyramids are solid mounds raised over the sepulchral chambers of the kings, the first act of an Egyptian monarch being to prepare his future 'eternal abode.' For this purpose, a shaft of the size of the intended sarcophagus was first hollowed in the rock at a suitable incline to lower it, and at a convenient depth a rectangular chamber was excavated in the solid rock. Over this chamber, a cubical mass of masonry, of square blocks, was then placed, leaving the orifice of the shaft open. Additions continued to be made to this cubical mass both in height and breadth as long as the monarch lived, so that at his death all that remained to be done was to face or smooth the exterior of the step-formed mound. But in some cases, the masonry passed beyond the orifice of the shaft, which involved the construction of a new shaft, having its orifice beyond it. The Pyramid was faced by adding courses of long blocks on each layer of the steps, and then cutting the whole to a flat or even surface, commencing from the summit. The outer masonry, however, or casing, as it is called, has in most instances been partially stripped off. Provision was made for protecting the vertical joints by placing each stone half way over another. The masonry is admirably finished; and the mechanical means by which such immense masses of stone were raised to their places has long been a mystery; the discovery, however, of large circular holes in some of the stones has led to the conclusion that they were wound up by machines. The stones were quarried on the spot; sometimes, however, granite taken from the quarries of Syene was partially employed. The entrances were carefully filled up, and the passage protected by stone portcullises and other contrivances, to prevent ingress to the sepulchral chamber. There appears to have been also a door or pylon at the entrance of the shaft, ornamented with Egyptian sculptures and hieroglyphs. The sides of the pyramids face the cardinal points, and the entrances face the north. The work of the larger Pyramids was executed by corvées of labourers. The most remarkable and finest Pyramids are those of Gizeh, situated on a level space of the Libyan chain at Memphis, on the west

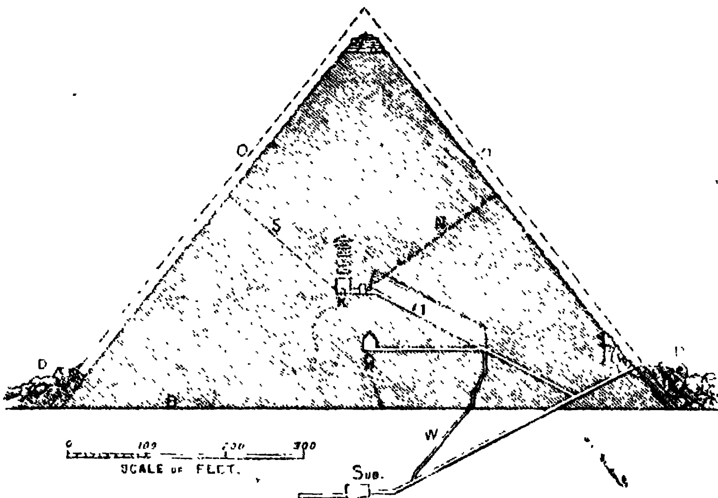


Supposed Mode of Construction of Pyramids:
(From Gliddon's *Egyptian Archæology*.)
A, Section of a Pyramid; B, horizontal section of the base, rubble work, and casing of a Pyramid; C, apex of a Pyramid, shewing the process of finishing from the top downwards.

bank of the Nile. The three largest are the most famous.

The first or Great Pyramid, as appears from the excavations of Vyse, was the sepulchre of the Cheops of Herodotus, the Chembes, or Chemmis, of Diodorus, and the Suphis of Manetho and Eratosthenes. Its height was 480 feet 9 inches, and its base 764 feet square; in other words, it was higher than St Paul's Cathedral, on an area the size of Lincoln's Inn Fields. Its slope or angle was 51° 50′. It has been, however, much spoiled and stripped of its exterior blocks for the building of Cairo. The original sepulchral chamber, called the Subterranean Apartment, 46 feet × 27 feet, and 11 feet 6 inches high, has been hewn in the solid rock, and was reached by the original passage of 320 feet long, which descended to it by an entrance at the foot of the Pyramid. The excavations in this direction were subsequently abandoned, on account of the vast size attained by the Pyramid, which rendered it impracticable to carry on the entrance on a level with the natural rock, which had been cut down and

faced for that purpose. Accordingly, a second chamber, with a triangular roof, was constructed in the masonry of the pyramid, 17 feet × 18 feet 9 inches, and 20 feet 3 inches high. This was reached by a passage rising at an inclination of 26° 18′, terminating in a horizontal passage. It is called the Queen's Chamber, and occupies a position nearly in the centre of the Pyramid. The monument—probably owing to the long life attained by the monarch—still progressing, a third chamber, called the King's, was finally constructed, by prolonging the ascending passage of the Queen's Chamber for 150 feet further into the very centre of the Pyramid, and after a short horizontal passage, making a room 17 feet 1 inch × 34 feet 3 inches, and 19 feet 1 inch high. To diminish, however, the pressure of the superincumbent masonry on the flat roof, five small chambers were made vertically in succession above the roof, the last one pointed, varying in height from 1 foot 4 inches to 8 feet 7 inches, the apex of the top one being rather more than 69 feet above the roof of the King's Chamber. The end of the horizontal passage was finished in a superior style, and cased with red syenitic granite; and in the King's Chamber was the granite sarcophagus of the king Cheops, 7 feet 6½ inches long, 3 feet 3 inches broad, and 3 feet 5 inches high, for whom the Pyramid was built.* As the heat of this chamber was stifling, owing to want of ventilation, two small air-channels, or chimneys, about nine inches square, were made, ascending to the north and south sides of the Pyramid. They perfectly ventilate this chamber.



Section of Great Pyramid of Gizeh:

(From Vyse's *Pyramids of Gizeh.*)

D, débris and remains of casing; Q, queen's chamber; K, king's chamber; O, outer casing line; S, N, air channels; W, well; sub., subterranean apartment.

After the mummy was deposited in the King's Chamber, the entrance was closed with granite portcullises, and a well made at the junction of the upward-inclined and horizontal passages, by which the workmen descended into the downward-inclined passage, after carefully closing the access to the sepulchral chambers. The changes which took place in this Pyramid gave rise to various traditions, even in the days of Herodotus, Cheops being reported to lie buried in a chamber surrounded by the waters of the Nile. It took a long time for its construction—100,000 men being employed on it for thirty years, or more probably for above half a century, the duration of the reign of Cheops, which is dated by different chronologists at 3229, 3095, or 2123 B. C. The operations in this Pyramid by General Vyse gave rise to the discovery of marks scrawled in red ochre in a kind of cursive hieroglyphs on the blocks brought from the quarries of Tourah. These contained the name and titles of Khufu (the hieroglyphic form of Cheops); numerals and directions for the position of materials: with them were masonic marks.

The second Pyramid is situated on a higher elevation than the first, and was built by Suphis II., or Kephren, who reigned 66 years, according to Manetho, and appears to have attained a great age. It has two sepulchral chambers, and appears to have been broken into by the Calif Alaziz Othman Ben-Yousouf, 1196 A. D. Subsequently, it was opened by Belzoni. The masonry is inferior to the first, but it was anciently cased below with red granite.

The third Pyramid, built by Menkara, or Mycerinus, who reigned sixty-three years, is much smaller than the other two, being only 218 feet high by 354 feet 6 inches square. It has also two sepulchral chambers, both in the solid rock. The lower sepulchral chamber, which held a sarcophagus of rectangular shape, of whinstone, had a pointed roof, cut like an arch inside; but the cedar coffin, in shape of a mummy, had been removed to the upper or large apartment, and its contents there rifled. Amongst the débris of the coffin and in the chambers were found the legs and part of the trunk of a body with linen wrapper, supposed by some to be that of the monarch, but by others to be that of an Arab, on account of the anchylosed right knee. This body and fragments of the coffin were removed to the British Museum; but the stone sarcophagus was unfortunately lost off Carthagena, by the sinking of the vessel in which it was being transported to England. The masonry of this Pyramid is most excellent, and it was anciently cased half-way up with black granite.

There are six other Pyramids of inferior size and interest at Gizeh; one at Abou Ronash, five miles to the north-west of the same spot, is ruined, but of large dimensions; another at Zowyet El Arrian, also made of limestone, is still more ruined; another at Reegah, a spot in the vicinity of Abooseer, also much ruined, and built for the monarch User-en-Ra, by some supposed to be Busiris. There are five of these monuments at Abooseer, one with a name supposed to be that of a monarch of the third dynasty; and another

* The opinion that this granite, or porphyry coffer, was a sarcophagus, has been questioned, and the theory has been advanced that it was a standard measure of capacity, of which the British quarter is the fourth part.—See J. Taylor's *The Great Pyramid; Why was it Built?* (1859), and Piazzi Smyth's *Our Inheritance in the Great Pyramid* (1864).

with that of the king Sahura. A group of eleven Pyramids remains at Sakkara, one with a doorway inlaid with porcelain tiles, and having a royal name. Five other Pyramids are at Dashour, the northernmost of which, built of brick, is supposed to be that of the king Asychis of Herodotus, and has a name of a king apparently about the twelfth dynasty. Others are at Meydoon and Illahoon; and two at Biahmo, at Medinat El Fyoum, apparently the sepulchres of the last kings of the twelfth dynasty. Some small brick Pyramids of the kings of the eleventh dynasty are at the Drah Aboo Negger at Thebes. In Nubia, the ancient Æthiopia, are several Pyramids, the tombs of the monarchs of Meroë, and of some of the Ethiopian conquerors of Egypt. They are taller in proportion to their base than the Egyptian Pyramids, and generally have a sepulchral hall, or propylon, with sculptures, which faces the east. The principal groups of these Pyramids are at Bego Raufe, or Begromi, 17° N. lat., in one of which, gold rings and other objects of late art, resembling that of the Ptolemaic period, were found.

In Assyria, the Birs Nimrud, or Tower of Belus, was a kind of step-shaped Pyramid of seven different-coloured bricks, dedicated to the planets by Nebuchadnezzar. The Mujellibe, another mound, was of pyramidal shape. The Pyramid also entered into the architecture of the tomb of Sardanapalus at Tarsus, and of the Mausoleum of Artemisia at Halicarnassus. A small Pyramid, the sepulchre of C. Cestius, imitated from the Egyptian in the days of Augustus, still exists within the wall of Aurelian at Rome. Temples and other monuments of pyramidal shape are found in India, China, Java, the Polynesian Islands, and elsewhere. The Toltecs and Aztecs erected temples in Mexico, called *Teocalli*, or abodes of gods, of pyramidal shape, with steps or terraces by which to ascend and reach an altar, generally placed on the summit, where they performed human sacrifices and other rites. These, however, are not true Pyramids, the pure and simple form of which is restricted to Egypt. The Pyramid entered extensively into the architecture of the Egyptians, and appears on the tops of obelisks and tombs as a kind of roof. Small models of Pyramids, with inscribed adorations to the sun, or having royal names, were also placed in the tombs.—Lepsius, *Ueber den Bau der Pyramiden*, 1843; *Briefe*, pp. 143, 217; Wilkinson, *Topogr. of Thebes* (Lond. 1835); Vyse, *Operations carried on at Gizeh in* 1837 (8vo. Lond. 1840–1842); Gliddon, *Otia Ægyptiaca* (Lond. 1849).

PY'RAMUS AND THI'SBE. The tragical history of these two lovers is told by Ovid in the 4th book of his *Metamorphoses*. They were natives of Babylon, and tenderly attached to each other, but as their parents would not hear of their marriage, they had to content themselves with clandestine interviews by night. On one occasion they arranged to meet at the tomb of Ninus, where Thisbe, who was first at the trysting-spot, was startled to discover a lioness. She immediately ran off, but in her terror and haste, dropped her garment, which the fierce animal, that had just torn an ox in pieces, covered with blood. Soon after, Pyramus appeared, and seeing his mistress's robe, came to the conclusion that she had been murdered, whereupon he killed himself. Thisbe now returned, and beholding her lover lying dead on the ground, put an end to her own life. The story was a favourite one during the middle ages, when a couple, unhappy in their love, were termed a *Pyramus and Thisbe*. Shakspeare, in his *Midsummer Night's Dream*, has introduced it—but in a way that has the effect of caricature.

PY'RENEES, the name of that mountain-range which, separating France from Spain, extends 270 miles in length, and from 30 to 70 miles in breadth, from the Gulf of Rosas, in the Mediterranean, to the south-east corner of the Bay of Biscay. This mountain-system, covering an area estimated at 12,600 sq. m., consists of two great chains, one of which runs east from the Bidassoa to the west bank of the Noguera Pallaresa; and the other, originating in the Pic du Midi d'Ossau (9510 feet), lat. about 0° 25' W., a little to the north of the former, extends eastward, and, after being intersected at the Val d'Aran by the Garonne and many smaller streams, reaches the Mediterranean, on the shores of which, immediately north of the Gulf of Rosas, it terminates in the promontories of Norfeo and Creuz. The *northern* slopes of these mountains to the plains and undulating districts of the south-west of France, are of gradual descent; while the southern slopes descend to the mountainous regions of Northern Spain by steep terraces. That portion of this mountain-system in which the eastern part of the southern, and the western part of the northern chains run parallel to each other, is called the High or Middle P.—a district about 16 miles in length, and forming the wildest and most elevated portion of the whole system. In the south-west of the Middle P. is a series of lofty summits, beginning with the Pic du Midi de Pau (9544 feet), and ending with the barren Maladetta, whose highest point, the Pic de Nethou or Malahite (11,168 feet), is the highest summit in the system. Between these two summits, there are several upwards of 10,000 feet high, as Mont Perdu (10,994 feet). The north-eastern and less elevated portion of the Middle P. forms a rampart, frequently interrupted by transverse valleys, and of which the principal summits are the Pic de Gavisos (8170 feet) and the Pic du Midi de Barèges (9307 feet). The Eastern P. rise in their highest summits into the region of perpetual snow, and as far as the sources of the Segre, form a mighty unbroken wall of rock. From this point, however, they assume a different character, decreasing in height, and being intersected by valleys. The West P. nowhere reach the snow-line, as their highest summit, the Pic d'Anie, does not rise above 7500 feet. Forming at first ridges of from 6000 to 7000 feet, they decrease in height as they extend west, until, on the Lower Bidassoa, they take the form of isolated masses about 3000 feet high. The average height of the P. is from 6000 to 7210 feet. At an almost equal elevation are most of the mountain-passes. These passes, called in some places *cols*, in others *ports* (Span. *puerto*), are about 100 in number, though only seven of them are practicable for wagons and cannon. The most important are the roads of St Jean de Luz over the Bidassoa to Vittoria, St Jean Pied du Port to Pampluna, and that from Perpignan over Junquera to Gerona. The P. comprise no extensive and long valleys. Generally, the valleys are small and caldron-shaped, and communicate by means of narrow passes. The rivers are inconsiderable. The region of perpetual snow, which, on the northern slopes of the mountains, begins at the height of 8137 feet, and on the southern slopes at 8858 feet, comprises no extensive snow or ice tracts. Glaciers are few and small, and nowhere occur lower than 7800 feet. On the warm and dry southern slopes, no glaciers occur. Few forests exist, and the steep walls of rock, parched by the sun and mid-day winds, are either quite bare, or are covered with low brushwood and meagre pasture. The more gradually declining northern slopes, on which snow and springs are more abundant, shew a richer vegetation, and are for the most part covered

with lofty forests, and beautiful mountain pasture. Granite forms the kernel of the Pyrenean mountain-system, and is overlaid by chalk and sandstone masses. The P. are not rich in metals, but abound in mineral springs, of which the chief are those of Bagnères de Bigorre (q. v.) and Barèges.

PYRÉNÉES, Basses, a department forming the south-west corner of France. Area 2943 sq. m.; pop. 436,628. The department is divided into the five arrondissements of Pau, Oloron, Orthez, Bayonne, and Mauléon. Chief town Pau. The Basses-P. occupies the northern slopes of the Western Pyrenees, offshoots from which divide the department into a number of valleys, each traversed by a clear mountain stream, locally known as a *gave*. The chief of these are the Gave d'Oloron, Gave de Pau, the Bidouze, and Nivelle. The high valleys and slopes are generally fertile, and well adapted for the growth of the vine, chestnut, various other fruits, and maize, though not for wheat. The best wines are those of Jurançon and Gan, Pontac and Auberlin. Flax and hemp, rye, barley, oats, and millet are also grown; but the principal source of industry, after the making of wine, is the rearing of horses, cattle, sheep, and mules for the Spanish markets, and the raising of swine in the great beech-forests, together with the preparation of hams of excellent quality and high flavour. Marble, alabaster, slate, ophite, copper, iron, sulphur, and cobalt, constitute the chief mineral products; but their importance as sources of wealth falls short of that of the numerous mineral springs, the most important of which are those of Biarritz, Cambo, Eaux-Bonnes and Eaux-Chaudes.

PYRÉNÉES, Hautes, a department of France, lying east of the Basses-Pyrenees, is a part of the old province of Gascony. The Hautes-P., which, as its name implies, contains the loftiest summits of the Pyrenean chain, is divided into the three arrondissements of Tarbes, Argèles, and Bagnères, and the chief town is Tarbes. The aspect of the scenery is, moreover, very varied—savage mountains and precipitous rocks in the south, an agreeable diversification of hill with dale in the centre, softening down to fertile plains in the north. The principal rivers, none of which, however, are navigable in the department, are the Adour and the Gave de Pau. The climate is generally mild in the plains and sheltered valleys, but even there, storms are of frequent occurrence. The well-cultivated and artificially watered low lands yield good crops of cereals, leguminous plants, flax, fruits of every kind, including the grape, from which excellent wine and brandy are made. Horses, mules, cattle, sheep, swine, and poultry, are much reared. This department, which is the richest part of the Pyrenees in mineral products, especially marble of various kinds, copper, iron, zinc, lead, antimony, slate, granite, &c., contains also the most celebrated springs, as the sulphur springs at St Sauveur, and the hot-baths of Bagnères, Barèges, and Cauterets. The very limited commercial industry of Hautes-P. embraces the manufacture of woollen and mixed fabrics, including bareges, colouring matters, leather, paper, cutlery, &c. There is also an active smuggling trade with Spain.

PYRÉNÉES-ORIENTALES, a maritime department of France, is bounded on the E. by the Mediterranean, and on the S. by the Pyrenees. Area 1592 sq. m.; pop. (1862) 181,763. It is divided into the three arrondissements of Perpignan, Prades, and Ceret. The chief town is Perpignan. Like the two previously described, this department presents a series of parallel valleys formed by spurs from the Pyrenees, but in this case the valleys run east and west. They are three in number, and are watered by the Gly, Têt (the principal river), and Tech. The south-west corner is drained by the Segre (Segura), a tributary of the Ebro. An extended plain occupies all the north and east of the department. The climate is good, and in the plains is seldom disturbed by great extremes of heat or cold. The vegetable products include fine grain and some of the choicest fruits of this latitude. Wines constitute the wealth of the district, and include the red wines of Roussillon, the white muscatel of Rivesaltes, and other approved kinds. The chief exports are wine, cocoons, the surplus live stock and its products, sardines, anchovies, &c. The mineral wealth of the district is not remarkable.

PYRITES, a name employed by mineralogists to designate a large group or *family* of minerals, compounds of metals with sulphur, or with arsenic, or with both. They are crystalline, hard, generally brittle, and generally yellow. The name P. originally belonged to the sulphuret of iron, known as Iron P.; and was given to it in consequence of its striking fire with steel (Gr. *pyr*, fire), so that it was used for kindling powder in the pans of muskets before gun-flints were introduced. Iron P. is commonly of a bright brass-yellow colour; it is often found crystallised in cubes, in which form small crystals of it are abundantly disseminated in some roofing-slates; and very large ones occur in some of the mines of Cornwall; it is also found crystallised in dodecahedrons and other forms, more rarely in oblique four-sided prisms; and it often occurs massive, globular, stalactitic, capillary, or investing other minerals as an incrustation. Beautiful specimens of globular iron P. are found in the chalk of England. It is a very widely diffused and plentiful mineral, and seems to belong almost equally to all geological formations. It is too abundant in many coal-fields, the action of water and air changing it into sulphate of iron (vitriol), during which change so much heat is evolved that the coal is frequently kindled by it, mines become unworkable, and the progress of the fire can only be stopped, if at all, by building up portions of them to cut off the access of air, or by the admission of a plentiful supply of water. At Quarreltown, in Renfrewshire, a deep hollow may still be seen, where, about a century ago, the ground fell in, in consequence of a subterranean fire thus kindled. The colour of Iron P. has often caused it to be mistaken for gold, a mistake which its hardness and comparative lightness should prevent, or its ready solubility in nitric acid, and its burning before the blowpipe on charcoal with bluish flame and smell of sulphur. But it sometimes does contain a small proportion of gold, sometimes even in visible grains. This auriferous Iron P. is found in Siberia and in South America. Iron P. is never used as an ore of iron, but it is much used for the manufacture of sulphuric acid, and sulphur is obtained from it by sublimation. It is also used for the manufacture of alum.—A variety of Iron P. of a very pale colour is called *Marcasite*. There is also a magnetic variety.—Copper P., also called *Yellow Copper* and *Chalcopyrite*, is the most abundant of all the ores of copper, and yields a large proportion (perhaps a third) of the copper used in the world. It is brass-yellow, the colour varying with the amount of copper which it contains, a rich colour indicating much copper, and a pale colour the presence of a comparatively large amount of iron; for this ore is not a sulphuret of copper, but of copper and iron. It occurs massive and disseminated in rocks of almost every class; and is often found crystallised in octahedrons and tetrahedrons, but generally in very small crystals. It may at once be distinguished from Iron P. by its

comparative softness, yielding readily to the knife, and by the green colour of its solution in nitric acid. Before the blowpipe, with borax and soda, it yields a bead of copper.—COBALT P., or *Cobaltine*, a sulphuret and arseniuret of copper, is a principal ore of cobalt. It is generally of a silver-white colour, and occurs massive, disseminated, or crystallised in cubes, octahedrons, dodecahedrons, and polyhedrons, in primitive rocks.—NICKEL P., also called *Copper-Nickel* and *Nickeline*, used as an ore of nickel, is a compound of nickel and arsenic. It is generally found massive, and is of a copper-red colour.

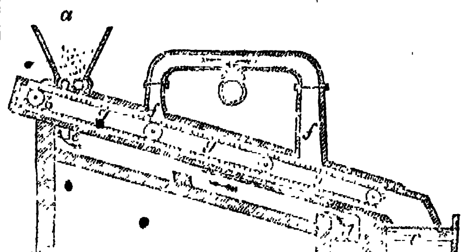
PYRMONT. See WALDECK AND PYRMONT.

PY'ROLA AND PYROLA'CEÆ. See WINTER GREENS.

PYROLI'GNEOUS ACID, or WOOD VINEGAR, a crude commercial form of Acetic Acid (q. v.). It is made by the destructive distillation of wood, and contains, besides acetic acid, tar and other products, which have to be removed if it is required in a very pure state. Generally, it is obtained in Britain from oak branches, which, after being stripped of their bark, are too small for timber purposes. These are cut into short billets, which are placed in cast-iron retorts, and a sufficient heat applied to drive off the volatile constituents and carbonise the wood. The best woods for the distiller are 'hard' woods, although all will yield it. This will be seen from the following table, which partly summarises the experiments of Stolze:

	100 Parts of Dried Wood give	
	Crude Pyroligneous Acid.	Pure Hydrated Acetic Acid.
Birch (*Betula alba*),	45·0	4·47
Beech (*Fagus sylvatica*),	41·0	4·29
Oak (*Quercus robur*),	43·0	3·88
Ash (*Fraxinus excelsior*),	46·8	3·72
White Poplar (*Populus alba*),	45·8	3·23
Bird Cherry (*Prunus padus*),	47·3	2·92
Juniper (*Juniperus communis*),	45·8	2·34
Spruce Fir (*Pinus abies*),	41·2	2·16
Scotch Fir (*Pinus sylvestris*),	42·4	2·14

Quick distillation is always found to be much more productive than slow, and the acid is also freer from impurities; for the slower the process, the thicker and darker is the tarry matter. Hence two separate plans have been invented, one by Mr Halliday, and the other by Mr W. H. Bowers, both of Manchester, in which sawdust, chips, shavings, and spent dye-woods are used. In Mr Halliday's plan, the retort is a long tube, with the fire acting along its entire length; inside is an Archimedean screw, worked by machinery, which passes the sawdust or other material slowly from the commencement to the end, where, by a particular contrivance, it falls out in the state of thoroughly carbonised wood. It is supplied by means of a hopper. The volatile matters pass up an outlet-pipe in the upper part of the tubular retort. In Mr Bowers's plan, the principle is similar, though differently carried out, as seen in the wood-cut. *a* is the hopper through which the sawdust is fed; and it is always kept well supplied, so that, by the pressure of the supply, the escape of vapour may be prevented; *ggg* is an endless chain worked over the four rollers by a small steam-engine, and carrying the materials from the hopper by means of projections on the chain along the lower side of the retort, so as to bring them in contact with the furnace *d*, which, after passing along in the direction of the arrow, has its flue at *e*. By the time the material reaches the bottom, all the volatile matters have been vaporised, and have passed up into the condenser at *ff*, and the carbonised material falls into a cistern of water at *c*, into which the open end of the retort dips, the water closing it sufficiently. One of these retorts will yield about 200 gallons per day of pyroligneous acid. This acid is of great use in the arts, especially in making



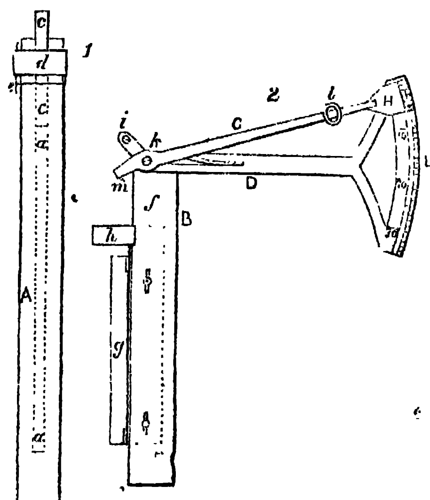
the acetates used by dyers and calico printers; and it is also, when very carefully purified and properly diluted with water, used extensively as a substitute for common vinegar in pickling, and even for table use.

PY'ROMANCY. See DIVINATION.

PYROMA'NIA is an involuntary, motiveless tendency to destroy by means of fire. The blind instinct to burn is often manifested in children before reason or a knowledge of property can actuate them, and with no other object than mischievous destructiveness, or to enjoy the blaze of a conflagration. In a large number of the cases, where legal investigation has disclosed the mental condition of the incendiary, and where the motive could not be determined, or was obscure or inadequate, the perpetrators were youthful, of the female sex, and about the period of puberty. It is to be observed that the most remarkable example in modern times of this morbid tendency appearing epidemically, was presented in Normandy in 1830, where barns, granges, and vineyards over a large tract of country were consumed, and where the actors were exclusively girls. When apprehended in numbers, they confessed that, though prompted by *internal sensations*, they had no other explicable purpose than to see the light. But this is the pure and typical form of the propensity. In general, insane incendiarism is the result of, or is complicated with, a very obvious incentive. Jonathan Martin, being insane, but impelled by superstition, set fire to York Minster (1829); and passions and delusions of every character, personal and political antipathies, and the spirit of agrarian outrage, may seek gratification in this kind of desolation. Like other outbursts of frenzy, it has been observed to accompany famines, pestilences, and great social convulsions.—Feuchtersleben, p. 293; Marc, *De la Folie*, t. ii. p. 305.

PYRO'METER (Gr. *pyr*, fire, and *metron*, a measure) is a term originally applied by Muschenbroek in 1731, to an instrument which he invented for measuring the changes produced in the dimensions of solid bodies by the application of heat. It is, however, now applied to any instrument the object of which is to measure all gradations of temperature above those that can be indicated by the Mercurial Thermometer (q. v.). Desaguliers gives a description of Muschenbroek's instrument, as improved by himself, in his *Experimental Philosophy*. Numerous pyrometers have since been invented, amongst which may be noticed those of Ellicott (described in *The Philosophical Transactions* for 1736 and 1751), Graham (in Do. for 1754), Wedgwood (in Do. for 1782, 1784, and 1786), and Guyton (in the *Annales de Chimie*, tome 46). None of these instruments, however, gave accurate results for very high temperatures; and it was not till the year 1821 that Professor

Daniell announced the invention of his pyrometer, which has supplanted all others, and for which, in an improved form, he received the Rumford Medal from the Royal Society. It consists of two distinct parts, the *register* (1) and the *scale* (2). The register is a solid bar of black-lead earthenware, A, eight inches long, cut out of a common black-lead crucible. In the axis of this, a hole is drilled, reaching from one end of the bar to within half an inch of the other extremity; and in this cylindrical cavity a bar, *a a*, of metal (as platinum or iron, for example) is placed. A cylindrical piece of porcelain, *cc*, sufficiently long to project a short distance beyond the extremity of the black-lead bar, is placed on the top of the metallic bar. This is termed the index, and it is kept firmly in its position by a ring or strap of platinum, *d*, which is tightened by a wedge of porcelain, *e*. When the register is exposed to a high temperature, the expansion of the metallic rod, *aa*, forces the index forward; and when the register has afterwards cooled, the tension of the strap will retain the index at the furthest point to which it has been protruded. The scale (2) consists of a frame composed of two rectangular plates of brass, *f*, *g*, joined together by their edges at a right angle, and fitting square upon two sides of the register. Near the end of this frame is a small brass plate, *h*, which projects at a right angle.



Daniell's Pyrometer.

To the extremity of the frame nearest the brass plate is attached a movable arm, D, turning round a fixed centre, *i*, and at its free end carrying the arc of a circle, E, the radius of which is five inches, and which is accurately graduated into degrees and thirds of a degree. Upon this arm, at the centre, *k*, another lighter arm, C, is made to turn, carrying at its longer part a Vernier (q. v.), H, which moves on the face of the arc, and divides it into minutes, together with an eye-glass, *l*, to assist the reading; while the shorter part terminates in a knife-edge *m*, turned inwards at a right angle.

To use the instrument, the scale is carefully applied, the brass plate, *h*, being pressed upon the shoulder of the register, and the lighter arm being so placed that the steel point, *m*, may rest on the top of the index in a notch cut for it which coincides with the axis of the rod. The position of the index being then read off on the scale, the register is detached and exposed to the heat to be measured; after it is removed and cooled, it is again placed in the scale, and the new position of the index read off; the difference of the two readings determining the expansion of the metallic bar above that of the black-lead. In order to employ the instrument as a measure of temperature as well as of expansion, Professor Daniell adopted the doubtful assumption that equal increments of length are the effects of equal increments of temperature. For further information on this instrument and its uses, we must refer to the original memoir in the *Philosophical Transactions* for 1830—1831.

In the Great Exhibition of 1851, Mr Ericsson exhibited in the United States' department a pyrometer in which temperatures were indicated by the tension of a permanent volume of air or of nitrogen gas, which was measured by the reading of a column of mercury under a vacuum. For a description of the instrument, we must refer to the Jury Report. M. Edmund Becquerel has recently (1864) published a very complete essay on pyrometry in the *Annales du Conservatoire*.

PY'ROPE, a beautiful and much-prized gem, often called *Carbuncle* and *Hyacinth* by lapidaries. It is nearly allied to garnet. It is composed of silica, alumina, magnesia, lime, and the protoxides of iron, chrome, and manganese. It is always of a deep red colour, and is transparent, or at least translucent. It generally occurs in roundish grains, but rarely in imperfectly cubical crystals. It is found chiefly in Saxony and Bohemia; also at Elie, in Fife, Scotland. The specimens found at Elie are popularly called *Elie Rubies*.

PYRO'PHORUS (from the Gr. *pyr*, fire, and *phero*, I bear) is a term applied to any substances which take fire from the rapidity with which they are oxidised. If iron, cobalt, or nickel be reduced by hydrogen from its oxide at a low red heat, it is obtained in a state of such extreme division as to become incandescent by the oxidising action of the atmosphere; and the tendency to rapid oxidation is much increased by the interposition of some infusible matter, as a little alumina or magnesia, between the particles of the oxide. This is probably due to the cohesion of the minute particles of the reduced metal being thus mechanically prevented, and the access of air to the surface of each particle being thus facilitated. If tartrate of lead be heated in a tube till the organic portion becomes charred, the metallic lead is reduced to a state of extreme subdivision, and usually takes fire when poured into the air. If finely-powdered sulphate of potash be mixed with half its weight of lamp-black, and heated in a covered crucible, the sulphate is reduced to sulphide of potassium, which remains in a finely-divided state, mixed with the excess of carbon, and takes fire spontaneously in the air from the rapid absorption of oxygen. These are amongst the best examples of pyrophori.

PYRO'SIS, or **WATERBRASH**, is a modification of dyspepsia, or indigestion, characterised by a burning sensation at the pit of the stomach, followed by the eructation of a considerable quantity of a thin, watery fluid, which is generally tasteless, but sometimes sour, and is often described by the patient as being cold. It occurs in paroxysms, which usually come on in the morning or forenoon, when the stomach is empty. The first symptom of it is a pain at the pit of the stomach, and a sense of constriction, as if the stomach were drawn towards the back. The pain is often very severe, and after continuing for some time it brings on the discharge of fluid which has been already mentioned, after which it lessens, and gradually disappears. When the attack has once occurred, it is commonly repeated at intervals for a considerable time.

It is usually accompanied with other symptoms of dyspepsia, and is sometimes associated with organic disease of the stomach, or of the liver. It seems to be due in a great measure to indigestible diet, and the too free use of spirits. When no organic disease is present, the affection usually disappears under the use of a well-regulated diet, and the administration of opium, combined with astringents (as in the Compound Kino Powder), care being taken to guard against the constipating effect of these drugs by the prescription of a mild aperient daily, as, for example, a little confection of senna, or three grains of the Compound Colocynth Pill, combined with two grains of Extract of Hyoscyamus. If this treatment fail, nitrate of bismuth, or oxide of silver, in appropriate doses, may be tried. In some cases a cure has been effected by the use of lime-water and milk.

PYROSO'MIDÆ, a family of tunicated molluscs forming the order *Dactylobranchiata* of Owen. They are marine, and swim freely in the water, many individuals usually combined together, by their elastic integument or *tunic*, into a mass of definite form and arrangement, nearly cylindrical, hollow, closed at one end, and open at the other. The individuals which form this group or mass have each a gill-sac with two gills, and inhale water by an orifice on the outer surface of the cylinder, expelling it by another orifice on the inner surface; and by the action of the stream of water which thus constantly flows from the open end of the cylinder, the whole mass is slowly propelled through the water with the closed end foremost. The P. are plentiful in warm seas. *Pyrosoma Atlanticum* is usually from three to seven inches long. The P. are brightly luminous.

PY'ROTECHNY, the art of making fireworks, is of unknown antiquity. It was practised amongst the Chinese from the earliest times, and has attained with them a perfection unknown in other countries. So much is this the case, that they treat as insignificant the most brilliant of our European displays. In their fireworks they introduce many surprises, such as figures of men and animals darting out, but they are somewhat deficient in the mechanical arrangements. Fireworks, as the name is now understood, were hardly known in Europe until the discovery of the composition of gunpowder, and for a long time only very simple pyrotechnic contrivances were used. At present they may be divided into two kinds—the simple hand-pieces, such as squibs, crackers, rockets, &c.; and the other, the fixed contrivances which have often very ingenious mechanical arrangements for making some of their parts revolve rapidly when being discharged. The materials used are gunpowder, sulphur, charcoal, saltpetre, filings of steel, iron, copper, &c., and several salts, such as nitrate of strontian, acetate of copper, common salt, &c. The ingredients of fireworks are usually filled into paper cases, made by rolling pasted paper round a cylinder of wood of the proper diameter, until the case is of sufficient thickness, and then cutting the paper tube so formed into the required lengths for squibs, Roman candles, small rockets, and similar articles; they seldom exceed ten inches; one end of each is closed by drawing a piece of string tightly round, so as to pinch it in, or *choke* it as it is technically called, and then dipping it into melted resin, which effectually seals it (*a*, figs. 1, 2, and 3). The combustible ingredients are filled in at the open end, and, if necessary, are



Fig. 1.

rammed down with a wooden ramrod; the opening is afterwards covered with a piece of touch-paper, to prevent the composition falling out, and to ignite it by (*b*, figs. 1, 2, and 3). The effects produced by fireworks are either streams of fire issuing straight out of the cases, and much varied with sparks in the form of stars, &c., and coloured with brilliant colours; or wheels of beautiful sparks produced by making the cases revolve rapidly. Revolving pieces are made by coiling the paper tube, when not too tightly filled, around a flat wooden centre (*c*, fig. 2); the force with which the combustion of the materials is carried on, is sufficient to make the board revolve with great rapidity. Small wheels of this kind are called *Catharine Wheels* (fig. 2). *Squibs* or *serpents* are made by filling tubes, eight to ten inches in length (fig. 1), with a composition of 1 lb. of nitre, 2 oz. of charcoal powder (rather coarse), 4 oz. of gunpowder, 4 oz. of sulphur, and 6 oz. of steel filings. The last is an important ingredient in many fireworks, producing brilliant, feather-like coruscations, which are the more beautiful the larger and cleaner the filings are. *Rockets* are tied to a wooden

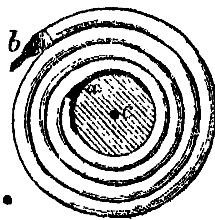
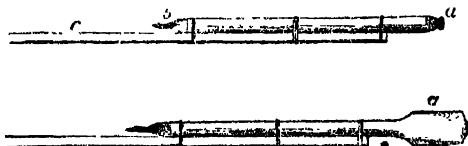


Fig. 2.



Figs. 3 and 4.

stick (*c*, fig. 3). When they are about to be discharged, this stick is stuck in the ground, and in that position the igniting point of the rocket, *b*, is downward; when lighted, it rushes into the air with great velocity, and reaches a considerable height, discharging as it goes a brilliant stream of sparks. Rockets require a hollow centre all down the tube; without this, they will not rise. At the end of their course, they often discharge brilliant clusters of golden, ruby, emerald, sapphire-like stars, or showers of golden or coloured rain, or of fiery serpents. This is produced by a supplementary part, called the *garniture* of the rocket, consisting of a shorter and broader paper tube called the *pot*, attached to the end of the fusee part of the rocket (as in fig. 4, *a*), and filled with a composition made into a paste with pure alcohol, and cut into stars, or granulated into small round bodies for drops. The serpents for rockets are small fusees, with the same composition as squibs; they are so packed in as to ignite all at once. The white stars are made of nitre, 16 parts; sulphur, 8 parts; gunpowder, 3 or 4 parts; nitrate of strontian added, makes them ruby red; sulphate or acetate of copper, and sulphate and carbonate of barytes, green; zinc filings give a blue colour. *Yellow stars* and *yellow showers* are made of nitre, 16 parts, 10 of sulphur, 4 of charcoal, 16 of gunpowder, and 2 of lampblack. A deeper and richer golden colour is produced by a very slight variation in the composition—viz., 2 parts less of sulphur and charcoal, and 4 additional of gunpowder. Many other ingenious devices are used by masters in the art of pyrotechny, but they are too numerous and too technical to come within the limits of this work. The

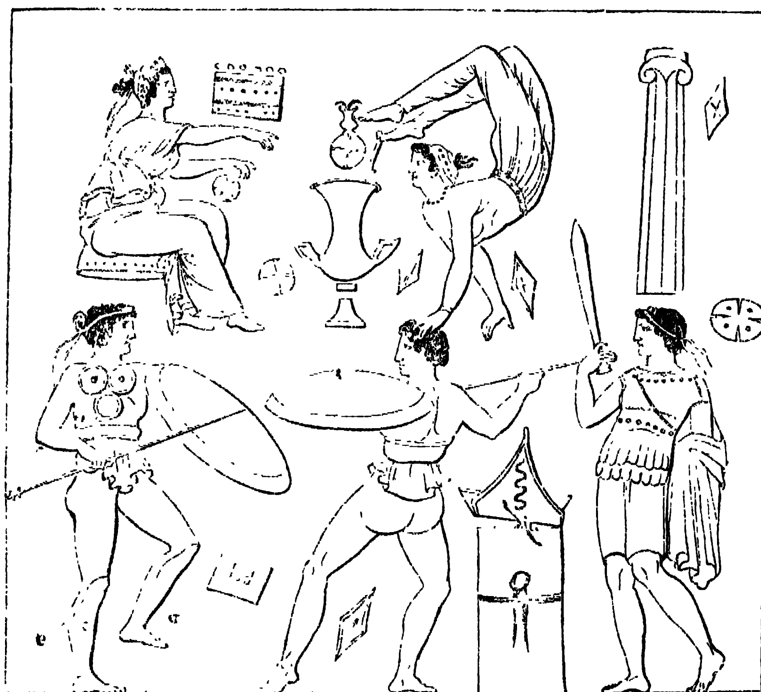
Roman candle is a favourite firework; it is a tube which is held on the ground, and discharges upwards a continuous stream of blue or white stars or balls. *Bengal lights* are cases of about an inch or more in diameter, filled with a composition of 7 parts nitre, 2 of sulphur, and 1 of antimony. These are much used as signals at sea; they diffuse an immense glare of bluish-white light. *Chinese* or *jasmine fire,* which is used by itself or in combination with other mixtures, consists of 16 parts of gunpowder, 8 of nitre, 3 of finely-powdered charcoal, 3 of sulphur, and 10 of small cast-iron borings; the last must be finer or coarser in proportion to the bore of the case to be filled. The compound devices in fixed fireworks, such as are seen at public entertainments, are very complicated in their structure, and are varied more or less by every artist. One nice point in the arrangement is to insure simultaneous ignition of all the various parts.

PY'ROXENE. See AUGITE.

PYROXY'LIC SPIRIT, WOOD SPIRIT, or **METHYLIC ALCOHOL,** a peculiar alcohol obtained by the destructive distillation of wood in the manufacture of Pyroligneous Acid (q. v.). It is one of numerous volatile products of that distillation, and has to be separated from the others by saturating it with the chloride of calcium, with which it combines, and is no longer volatile, except at a greater temperature than 212° F. It is therefore easily separated by means of a steam-bath from its more volatile associates, which are carried off at a temperature below boiling water. A higher temperature is afterwards applied to the residue, which is the compound of chloride of calcium and pyroxylic spirit, and the spirit is thus distilled off. Commercially, the discovery of this substance was of great importance, as many of its properties are the same as those of common alcohol; and now, notwithstanding a long opposition from the Revenue Board, its manufacture and importation are regularly allowed. It is of nearly equal value to alcohol in making varnishes, as it dissolves the resins, oils, and other similar substances. It has a peculiar naphtha-like odour, which is inseparable from it, and prevents its use as a potable spirit at present; but it has been asserted lately that some makers have almost made it odourless, and that it is consequently taking the place of common alcohol in the manufacture of cheap perfumes.

PYRO'XYLIN, a name for Gun Cotton (q. v.).

PY'RRHIC DANCE, the most famous of all the war-dances of antiquity, is said to have received its name from one Pyrrichos, or, according to others, from Pyrrhus or Neoptolemus, the son of Achilles. Critical scholars, however, content themselves with



Pyrrhic Dance.
(Copied from Sir W. Hamilton's work on *Greek and Roman Vases.*)

a general inference deduced from the substantial harmony of the various mythical or legendary accounts given of its origin—viz., that it was a Doric invention. It was danced to the flute, and its time was both quick and light, as may be seen from the Pyrrhic foot, composed of two shorts (⏑⏑), and the Prokeleusmatic, or challenging-foot, of two double shorts (⏑⏑ ⏑⏑). According to Plato, it aimed to represent the nimble motions of a warrior either avoiding missiles and blows, or assaulting the enemy; and in the Doric states, it was as much a piece of military training as an amusement. Elsewhere, in Greece, it was purely a mimetic dance, in which the parts were sometimes represented by women. It formed part of the public entertainments at the Panathenaic festivals. Julius Cæsar introduced it at Rome, where it became a great favourite. The *Romaika,* still danced in Greece, is

said to be a modern relic of the ancient Pyrrhic dance; but if Dr. Corrigan's description of it (*Ten Days in Athens*, 1861) is correct, it is not easy to see the resemblance.

PYRRHON (Lat. *Pyrrho*), the founder of a school of Greek scepticism, named after him, was a native of Elis, and was born in the first half of the 4th c. B.C. In his youth he is said to have been a painter, but was subsequently attracted to philosophy by the study of the writings of Democritus. Diogenes Laertius tells us that, along with Anaxarchus (one of his teachers, according to Aristocles), he joined Alexander the Great's eastern expedition; and it has been conjectured that, at this period, he obtained some knowledge of the opinions and beliefs of the Persian Magi and the Indian Gymnosophists. He died about the age of 90, after spending a great part of his life in retirement. P.'s scepticism was by no means of the thorough-going kind that is usually associated with his name, which is synonymous with absolute and unlimited infidelity. He certainly disbelieved in the possibility of acquiring a scientific knowledge of things, but (like Kant) he appears to have tenaciously maintained the reality of virtue and the obligations of morality. So greatly was he reverenced by his townsmen, on account of his personal excellences, and so little did they consider his philosophical scepticism a barrier to his holding a religious office, that they chose him high-priest of their sacred city, and for his sake declared all philosophers exempt from public taxes. Cicero (not so far wrongly either) ranks him among the Socratics; and, indeed, he was as much opposed to the pretensions of the Sophists as Socrates himself, though from a different point of view. P., so far as we know, wrote nothing; and the works of his friend and follower, Timon, are lost.

PYRRHUS, king of Epeirus, born about 318 B.C., a Greek warrior, whose personal bravery and passion for adventurous exploits equals anything recorded of the knights of chivalry, was the son of Æacides, who succeeded to the throne of Epeirus by the death of his cousin, Alexander, 326 B.C. Alexander was the brother of Olympias, the mother of Alexander the Great; and thus young P. was a distant kinsman of the Macedonian hero, whose career of far-stretching conquest he dared to dream of imitating. After experiencing many vicissitudes of fortune in his youth, he became sole king of Epeirus in 295 B.C.; and, in the following year, increased his territories by the addition of the western parts of Macedonia, which he obtained in reward for aiding Alexander, son of Cassander, against his brother, Antipater, in their struggle for the paternal inheritance. In 281 B.C., a glorious prospect opened up before the eyes of the restless warrior—nothing less than the conquest of Rome and the western world, which (if he should achieve it) would confer on him a renown equal to that of his Macedonian kinsman. The Tarentines, a Greek colony in Lower Italy, then at war with the Romans, sent an embassy to P., in the name of all the Greek colonies in Italy, offering him the command of all their troops against their enemies. The king was overjoyed at the proposal; instantly accepted it; and in the beginning of 280 B.C. sailed for Tarentum with 20,000 foot, 3000 horse, 2000 archers, 500 slingers, and a number of elephants. The gay, pleasure-loving Tarentines had no great relish for the rigorous service of war, and were far from pleased at the strict measures taken by P. to inure them to its hardships. The first battle between P. and the Romans (who were commanded by the consul, M. Valerius Laevinus) took place at the river Siris in Lucania. The contest was long, obstinate, and bloody; and P. only succeeded by bringing forward his elephants, whose strange appearance and gigantic size excited a sudden panic among the Romans. It was a hard-bought victory for P., who said, as he looked upon the field, thick-strewn with his numerous dead: 'Another such victory, and I must return to Epeirus alone.' Many of the Italian nations now joined P. (for Rome was not liked by her neighbours and dependents), and he proceeded on his march towards Central Italy. The Roman senate was thoroughly frightened, and would have come to terms with P., but for the stirring speech of old Ap. Claudius Cæcus, which made them resolve to 'fight it out' with the foreigner. P., after penetrating to within 20 miles of Rome, found it impossible to proceed further with safety, as one Roman army occupied the city, and another hung upon his flanks and rear. He therefore withdrew to Campania, and thence to Tarentum, where he wintered. The campaign of 279 B.C. was carried on in Apulia, and the principal engagement took place near Asculum. The Romans were again defeated; but P. himself lost so heavily, that he felt it impossible to follow up his victory; and again withdrew to Tarentum. Here a truce was entered into between the belligerents; and P. passed over into Sicily to assist the Sicilian Greeks against the Carthaginians, 278 B.C. His first exploits in that island were both brilliant and successful; but the repulse which he sustained in his attack on Lilybæum broke the spell which invested his name. Soon afterwards he became involved in misunderstandings with the Greeks; and in 276 B.C. he quitted the island in disgust, to renew his war with Rome. While crossing over to the mainland the Carthaginians attacked him, and destroyed 70 of his ships; and although he reached Tarentum in safety, his prospects were now much more clouded than at first. In 274 B.C. he fought a great battle with the Romans, under the consul Curius Dentatus, near Beneventum, and was utterly defeated, escaping to Tarentum with only a few personal attendants. He now saw himself forced to abandon Italy and return to Epeirus, where he almost immediately engaged in war with Antigonus Gonatas, son of Demetrius, and king of Macedonia. His success was complete, for the Macedonian troops deserted to him *en masse*, and he once more obtained possession of the country; but nothing could satisfy his love of fighting, and in less than a year he was induced to enter on a war with the Spartans. He marched a large force into the Peloponnesus, and tried to take their city, but was repulsed in all his attempts. He then proceeded against Argos, where he met his death, 272 B.C., in the 46th year of his reign.

PYRUS, a genus of trees and shrubs of the natural order *Rosaceæ*, suborder *Pomeæ*, having a 5-celled fruit, with a cartilaginous endocarp and two seeds in each cell. It includes species differing very much in appearance, in foliage, and in almost everything except the characters of the flower and fruit, and formerly constituting the genera *Sorbus*, *Aria*, *Aronia*, &c.; or included in *Mespilus* (see MEDLAR) and *Cratægus*. Some botanists separate the Apples (*Malus*) as a distinct genus. Amongst the species of P. are some of the most valuable fruits of temperate climates, and some highly ornamental trees and shrubs. See APPLE, PEAR, SERVICE, ROWAN, BEAM-TREE.

PYTHAGORAS. The life of this celebrated man, the founder of what is known as the Italic School of Philosophy, has been so greatly obscured by the mass of legends and incredible stories which

gathered in later ages round his name, that it is very difficult to arrive at anything like certainty regarding his history and character. That he was a native of the island of Samos, the son of Mnesarchus, a merchant, or, according to other accounts, a signet-engraver, we know on good authority. The date of his birth is very uncertain, but is usually placed about the year 570 B.C.; and all authorities agree that he flourished in the times of Polycrates and Tarquinius Superbus (540—510 B.C.). He is said to have been a disciple of Pherecydes of Syros, of Thales, and Anaximander, and, like other illustrious Greeks, to have undertaken extensive travels for the purpose of adding to his knowledge; in the course of which—lasting, we are told, for nearly 30 years—he visited Egypt (bringing with him, according to the usual story, letters of introduction from Polycrates to Amasis the king) and the more important countries of Asia, including even India. We have every reason to believe that he did, at all events, visit Egypt, and there availed himself of all such mysterious lore as the priests could be induced to impart: from whom possibly he learned the doctrine of Metempsychosis, or the transmigration of souls (which was, as is well known, one of the most famous tenets of the Pythagorean school), and whose influence may perhaps be traced in the mystic rites, asceticism, and peculiarities of diet and clothing which formed some of its chief characteristics—though we may consider it as nearly certain that his philosophic and religious system was much less indebted to the influence of other countries than the ancients generally believed. During his travels, we may believe, P. matured the plans which he afterwards carried into action; but finding, on his return to his native island, that the tyranny established there by Polycrates unfitted it for his abode, he quitted Samos, and eventually settled in the city of Croton, in Southern Italy. Here he is said to have acquired in a short time unbounded influence over the inhabitants, as well as over those of the neighbouring states; and here he established the famous Pythagorean fraternity or order, which has often been compared with the still more celebrated order founded by Ignatius Loyola in modern times. The adherents of P. were chiefly found among the noble and the wealthy; these, to the number of 300, he formed into a select society, bound by a sort of vow to himself and to each other, for the purpose of studying the philosophical system of their master, and cultivating the ascetic observances and religious rites enjoined by him. They thus formed at once a philosophical school and a religious brotherhood, which gradually assumed the character and exercised the power of a political association also. This political influence, which undoubtedly became very great, was constantly exerted on the side of aristocracy; and to carry out the principles of this form of government, understood in the best sense of the word, seems to have been the ultimate aim of Pythagoras. He is said also to have increased his influence by a practice unknown to the other sages of the ancient world—the admission of women, not probably into his society, but to attendance on his lectures and teaching. Of the internal arrangement and discipline of this fraternity we really know but little. All accounts agree that what was done and taught among the members was kept a profound secret from the outer world. In the admission of members, P. is said to have exercised the greatest care, and to have relied much on his skill in physiognomy. They then had, it is said, to pass through a long period of probation, intended apparently to test especially their powers of endurance and self-restraint—though probably the assertion that they had to maintain silence for two or even five years is an exaggeration of later times. Among the members of the society we are told there were several gradations, and there was also a more general division of his disciples under the names *Esoteric* and *Exoteric*—the former being applied to all who were admitted to the more abstruse doctrines and sublimer teaching of their master, the latter to those who received only the instruction open to all. The mode of life seems to have been regulated by P. in its minutest details. It is well known that he is said to have forbidden all animal food—a consequence, perhaps, of the doctrine of Metempsychosis—and also particularly beans (but these statements cannot be relied on), and there is no doubt that temperance of all kinds was strictly enjoined. In the course of instruction, great attention was paid to mathematics, music, and astronomy; and gymnastics formed an important part of the training. Religious teaching was inculcated in the so-called Pythagorean *Orgies* or *Mysteries*; and while he outwardly conformed to the usual mode of worship, there is reason to believe that in secret he taught a purer faith. The result of the whole system seems to have been an unbounded reverence on the part of the disciples for their master (of which the well-known *ipse dixit* is a sufficient attestation); in the members of the order an elevated tone of character, exhibited in serenity of mind and self-possession, extreme attachment to each other, and also supreme contempt for all the outer world. But it was natural that political power uniformly exercised in one direction by an aristocratic and exclusive society such as this should in the end excite a wide-spread feeling of jealousy and hatred, which at length, when opportunity was given, caused the overthrow of the fraternity. A war between the cities of Croton and Sybaris, in which the Pythagoreans took a prominent part, ended in the total destruction of the latter city (510 B.C.); and on this success they seem to have presumed so greatly, that they proceeded to more active measures against the popular party than they had yet attempted. A violent outbreak was the consequence; the house in which the leading Pythagoreans were assembled was set on fire, and many perished in the flames. Similar commotions ensued in other cities of Southern Italy in which Pythagorean clubs had been formed, and the result was that, as a political organisation, the Pythagorean order was everywhere suppressed, though, as a philosophical sect, it continued to exist for many years after. Of the fate of P. himself different accounts are given; but he is generally supposed to have escaped to Metapontum, and died there (504 B.C.), where his tomb was shewn in the time of Cicero.

P. is said to have been the first to assume the title of *Philosopher* ('Lover of wisdom') in place of the name *Sophos* ('Wise'), by which the sages had before been known. Various discoveries in music, astronomy, and mathematics are attributed to him; among others, the proposition now known as the 47th of Euclid, Book I. We have good ground for believing that he was a man of much learning and great intellectual powers, which were specially exerted in the way of mathematical research, as is evinced by the general tendency of the speculations of his school. There is no doubt that he maintained the doctrine of the transmigration of souls into the bodies of men and other animals—which seems to have been regarded in the Pythagorean system as a process of purification—and he is said to have asserted that he had a distinct recollection of having himself previously passed through other stages of existence. We are told that on seeing a

dog beaten, and hearing him howl, he bade the striker desist, saying, 'It is the soul of a friend of mine, whom I recognise by his voice.'

Respecting the system of philosophy actually taught by P., we have but little trustworthy testimony. P. himself, it is all but certain, wrote nothing, and the same seems to have been the case with his immediate successors; we are therefore, in endeavouring to form an idea of the Pythagorean philosophy, obliged to rely almost entirely on the compilations of later writers (mainly Diogenes Laërtius, and the Neo-Platonists, Porphyrius and Iamblichus, all of them long subsequent to the Christian era), who often but imperfectly understood the details they gave. The tendency of the school was 'towards the consideration of abstractions as the only true materials of science' (Lewes's *Biographical History of Philosophy*), and to *Number* was allotted the most prominent place in their system. They taught that in Number only is absolute certainty to be found; that Number is the Essence of all things; that things are only a copy of Numbers; nay, that in some mysterious way, Numbers are things themselves. This Number theory was probably worked out from the fundamental conception, that, after destroying or disarranging every other attribute of matter, there still remains the attribute Number; we still can predicate that the thing is *one*. With this doctrine of Number was intimately connected that of the *Finite* and the *Infinite*, corresponding respectively with the *Odd* and the *Even* in Number; and from a combination of this Finite and Infinite it was taught that all things in the Universe result. The abstract principle of all perfection was *One* and the *Finite*; of imperfection, the *Many* and the *Infinite*. Essentially based also on the same doctrine, was the Theory of Music; the System of the Universe, which was conceived as a *Kosmos*, or one harmonious whole, consisting of ten heavenly bodies revolving round a Central Fire, the *Hearth* or *Altar* of the Universe; and the celebrated doctrine of the Harmony of the Spheres—the music produced, it was supposed, by the movement of these heavenly bodies, which were arranged at intervals according with the laws of harmony—forming thus a sublime Musical Scale. The Soul of Man was believed to partake of the nature of the Central Fire, possessing three elements, Reason, Intelligence, and Passion; the first distinctive of Man, the two last common to Man and Brutes.

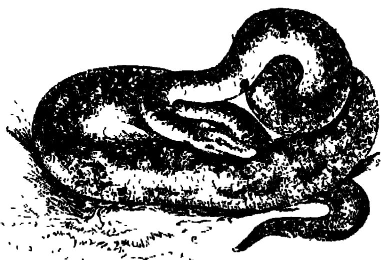
The Ethical teaching of the Pythagoreans was of the purest and most spiritual kind; Virtue was regarded as a harmony of the soul, a conformity with, or approximation to, the Deity; Self-restraint, Sincerity, and Purity of Heart were especially commended; and Conscientiousness and Uprightness in the affairs of life would seem to have been their distinguishing characteristics.

The Pythagorean system was carried on by a succession of disciples down to about 300 B.C., when it seems to have gradually died out, being superseded by other systems of philosophy; it was revived about two centuries later, and lasted for a considerable time after the Christian era—disfigured by the admixture of other doctrines, and an exaggeration of the mysticism and ascetic practices, without the scientific culture of the earlier school.

In addition to the writers above mentioned, scattered and scanty notices—affording, however, really the most trustworthy information that we possess, as to the life and doctrines of P.—occur in Herodotus, Plato, Aristotle (the latter especially), and a few other authors. Fuller details on the subject will be found in the Histories of Greece by Thirlwall and Grote, in the works of Ritter, Brandis, and Tennemann on the *History of Philosophy*; in Lewes's *Biographical History of Philosophy*; and a complete summary of the whole in Smith's *Dictionary of Greek and Roman Biography*.

PY'THIAN GAMES, one of the four great national festivals of the Greeks, held in the Crissæan plain, near Delphi, are said (according to the prevalent mythological legend) to have been instituted by Apollo after vanquishing the snaky monster, Python, and were certainly in the earliest times celebrated in his honour every ninth year. They were at first under the management of the Delphians, but about 590—586 B. C. the Amphictyons were intrusted with the conduct of them, and arranged that they should be held every fifth year. Some writers state that it was only *after* this date that they were called Pythian. Originally, the contests were restricted to singing, with the accompaniment of cithern-playing, but the Amphictyons added the flute, athletic contests, and horse-racing. By and by, contests in tragedy, and other kinds of poetry, in historical recitations, and in works of art, were introduced, and long continued a distinguishing feature of these games, which are believed to have lasted down to nearly the end of the 4th c. A. D. The prize was a laurel wreath and the symbolic palm-branch. Several of Pindar's extant odes relate to victors in the Pythian Games.

PY'THON, a genus of serpents of the family *Boidæ* (see BOA), differing from the true boas in having the plates on the under surface of the tail double. The tip of the muzzle is plated; the lips are grooved. The species are all natives of the Old World. They are all large; some of them very large, and rivalled in size by no serpents except the boas of America. The name Boa is often popularly given to the pythons, and in its ancient use belongs to them. Some of the pythons are known in the East Indies by the name of ROCK SNAKE, as *P. molurus*, a species very extensively diffused. This name is given to some species which belong to the genus or subgenus *Hortulia*, one of which, the NATAL ROCK SNAKE (*H. Natalensis*), is said to attain so large a size that its body is as thick as



Python, or Rock Snake (*Hortulia Natalensis*).

that of a man. Although a native of Natal, it is already unknown in the settled parts of the colony. *Python reticulatus* is probably the largest snake of India and Ceylon. It is found also in more eastern regions. What size it attains is not well known. Specimens of 15 or 20 feet long are common, but it certainly attains a much larger size. It seems to be this snake which is sometimes called ANACONDA. It is rather brilliantly coloured; its body being covered with gold and black, finely intermixed. The forehead is marked by a longitudinal brown stripe. Although sluggish for some time after a repast, it is at other times very active, and easily scales the highest garden walls. It feeds on deer and smaller animals, but the largest pythons are

said to seize buffaloes, tigers, and even elephants, and to crush them in their coils. In this there is perhaps some exaggeration; but there are well-authenticated stories of snakes in the East Indies quite capable of killing at least the buffalo and the tiger (see *My Indian Journal*, by Colonel Walter Campbell; Edin. 1864, pp. 126, 127).

PYX (Gr. *pyxis*, a box, properly of boxwood), the sacred vessel used in the Catholic Church to contain the consecrated eucharistic elements, which are preserved after consecration, whether for the communion of the sick or for the adoration of the faithful in the churches. Its form has varied very much at different times. Anciently it was sometimes of the form of a dove, which was hung suspended over the altar. More commonly, however, it was, as its name implies, a simple box, generally of the precious metals, or, at least, of metal plated with gold or silver. At present, the pyx is commonly cup-shaped, with a close-fitting cover of the same material. The interior is ordered to be of gold, or at least plated with gold. Like all the other sacred utensils connected with the administration of the eucharist, it must be blessed by a bishop, or a priest delegated by a bishop.



Pyx, Ashmolean Museum, Oxford.
(Copied from *Parker's Glossary*.)

PYX, TRIAL OF THE, the final trial by weight and assay of the gold and silver coins of the United Kingdom, prior to their issue from the Mint. It is so called from the Pyx, i. e., box or chest, in which are deposited specimen coins. When the coins are weighed into bags at the Mint, two pieces are taken out of each bag, one for assay within the Mint, the other for the pyx. The latter are sealed up by three officers and deposited in the chest or pyx. The trial takes place about once in three years by a jury of goldsmiths, summoned by the Lord Chancellor. The jury are charged by the Lord Chancellor, at the Exchequer Office, Whitehall, in presence of several privy councillors, and of the officers of the Mint. Being furnished with a piece of gold and silver from the trial plates deposited in the Exchequer, they are required to declare to what degree the coin under examination deviates from them. The jury then proceed to Goldsmiths' Hall, where assaying apparatus is in readiness, and the sealed packets of coin being delivered to them by the officers of the Mint, are first tried by weight, after which a certain number of pieces taken from the whole are melted into a bar, from which the assay trials are taken. A favourable verdict relieves the officers of the Mint from responsibility, and constitutes a public attestation of the standard purity of the coin.

Q



THE 17th letter of the Latin, English, and other western Alphabets, is identical in power with the letter K (q. v.). It is always followed by *u*.

QUADRAGE'SIMA (Lat. 'fortieth day'), the name of the Lenten season, or more properly of the first Sunday of the Lent. It is so called by analogy with the three Sundays which precede Lent, and which are called respectively Septuagesima, 70th; Sexagesima, 60th; and Quinquagesima, 50th.

QUADRA'NGLE, an open square, or courtyard having four sides. Large public buildings—such as Somerset House and the colleges of Oxford and Cambridge—are usually planned in this form.

QUA'DRANT (Lat. *quadrans*, a fourth part), literally the fourth part of a circle, or 90°; but signifying, in Astronomy, an instrument used for the determination of angular measurements. The quadrant consisted of a limb or arc of a circle equal to the fourth part of the whole circumference, graduated into degrees and parts of degrees. The quadrant employed by Ptolemy was of stone, with one smooth and polished side, on which the graduations were made; the quadrant was firmly placed in a meridian plane, with one radius vertical, and the other horizontal. Tycho Brahe, who has a right to be considered as the first great practical astronomer of modern times, fixed his quadrant on a wall, and employed it for the determination of meridian altitudes; he also adjusted others on vertical axes for the measurement of azimuths. Picart was the first who applied telescopic sights to this instrument. About this time the large mural quadrant (of 6 to 8 feet radius) began to be introduced into observatories. These quadrants were adjusted in the same way as the mural circle (see CIRCLE, MURAL). Various innate defects of the quadrant as an instrument—such as the impossibility of securing exactness of the whole arc, concentricity of the centre of motion with the centre of division, and perfect stability of the centre-work—led to its being superseded by the repeating circle, otherwise called the *Mural Circle* (q. v.).

Hadley's Quadrant is more properly an *octant*, as its limb is only the eighth part of a circle, though it measures an arc of 90°. Its principle is that of the SEXTANT (q. v.).

QUADRA'TIC EQUATIONS. See EQUATIONS.

QUA'DRATURE. This term is employed in Mathematics to signify the process of determining the area of a surface. Its derivation sufficiently indicates its nature—i. e., it consists in determining a *square* (the simplest measure of surface) whose area is equal to that of the assigned surface. In many cases, of which the Triangle (q. v.), the Parabola (q. v.), and the Cycloid (q. v.) are perhaps the simplest, the area is easily assigned in terms of some simple unit. Thus, the area of a triangle is half that of the rectangle with the same base and height; that of any parabolic segment is two-thirds of the corresponding triangle, whose sides are the chord and the tangents at its extremities; that of the cycloid three times that of its generating circle, &c.

The term is also applied in a special sense in cases in which an area or other quantity is expressed by an integral, whose value cannot be determined exactly; and it then means the process of approximation by which the value of the integral can be gradually arrived at.

All the practical rules for approximating to the areas of curvilinear figures, and the volumes of various solids—such as occur in land-measuring, gauging, engineering, &c.—are, in this sense, cases of quadrature, except in those very special cases in which an area or a volume can be assigned exactly as a finite function of its dimensions. See MENSURATION.

QUADRATURE OF THE CIRCLE. This is one of the grand problems of antiquity, which, unsolved and probably unsolvable, continue to occupy even in the present day the minds of many curious speculators. The trisection of an angle, the duplication of the cube, and the perpetual motion have found, in every age of the world since geometry and physics were thought of, their hosts of patient devotees. The *physical* question involved in the Perpetual Motion (q. v.) is treated of under that head; and we shall now take the opportunity of noticing the *mathematical* questions involved in the other problems above mentioned; but more especially that of the quadrature of the circle, in which the difficulty is of a different nature from that involved in the other two geometrical ones. A few words about them, however, will help as an introduction to the subject.

According to the postulates of ordinary geometry, all constructions must be made by the help of the circle and straight line. Straight lines intersect each other in but *one* point; and a straight line and circle, or two circles, intersect in *two* points only. From the analytical point of view we may express these facts by saying that the determination of the intersection of two straight lines involves an equation of the *first* degree only; while that of the intersection of a straight line and a circle, or of two circles, is reducible to an equation of the second degree. But the trisection of an angle, or the duplication of the cube, requires for its accomplishment the solution of an equation of the *third* degree; or, geometrically, requires the intersections of a straight line and a curve of the third degree, or of two conics, &c., *all of which are excluded by the postulates of the science.* If it were allowed that a parabola or ellipse could be described with a given focus and directrix, as it is allowed that a circle can be described with a given radius about a given centre, the trisection of an angle and the duplication of the cube would be at once brought under the category of questions resolvable by pure

geometry; so that the difficulty in these cases is one of mere restriction of the postulates of what is to be called geometry.

It is very different in the case of the quadrature of the circle, which (the reader of the preceding article will see at once) means the determination of the area of a circle of given radius—literally, the assigning of the side of a square whose area shall be equal to that of the given circle.

The common herd of 'squarers of the circle,' which grows more numerous every day, and which includes many men of undoubted sanity, and even of the very highest business talents, rarely have any idea of the nature of the problem they attempt to solve. It will, therefore, be our best course to shew first of all *what has been done* towards the solution of the problem; we shall then venture a few remarks as to *what may yet be done*, and in what direction philosophic 'squarers of the circle' must look for real advance.

In the first place, then, we observe that *mechanical processes are utterly inadmissible*. A fair approximation may, no doubt, be got by measuring the diameter of a circular disc of uniform material, and comparing the weight of the disc with that of a square portion of the same material of given side. But it is almost impossible to execute any measurement to more than six places of significant figures; hence, as will soon be shewn, this process is at best but a rude approximation. The same is to be said of such obvious processes as wrapping a string round a cylindrical post of known diameter, and comparing its length with the diameter of the cylinder: only a rude approximation to the ratio of the circumference of a circle to its diameter can thus be obtained.

Before entering on the history of the problem, it must be remarked that the Greek geometers knew that the area of a circle is half the rectangle under its radius and circumference (see CIRCLE), so that the determination of the length of the circumference of a circle of given radius is precisely the same problem as that of the quadrature of the circle.

Confining ourselves strictly to the best ascertained steps in the history of the question, we remark that Archimedes proved that the ratio of the diameter to the circumference is greater than 1 to $3\frac{10}{71}$, and less than $1\ \frac{10}{70}$ to 3. The difference between these two extreme limits is less than the $\frac{1}{1000}$ of the whole ratio. Archimedes's process depends upon the obvious truth, that the circumference of an inscribed polygon is less, while that of a circumscribed polygon is greater, than that of the circle. His calculations were extended to regular polygons of 96 sides.

Little more seems to have been done by mathematicians till the end of the 16th c., when P. Métius gave the expression for the ratio of the circumference to the diameter as the fraction $\frac{355}{113}$, which, in decimals, is true to the seventh significant figure inclusive. Curiously enough, it happens that this is one of the convergent fractions which express in the lowest possible terms the best approximations to the required number. Métius seems to have employed, with the aid of far superior arithmetical notation, a process similar to that of Archimedes.

Vieta shortly afterwards gave the ratio in a form true to the tenth decimal place, and was the first to give, though of course in infinite terms, an exact formula. Designating, as is usual in mathematical works, the ratio of the circumference to the diameter by π, Vieta's formula is—

$$\frac{1}{\pi} = \tfrac{1}{2}\sqrt{\tfrac{1}{2}} \times \sqrt{\tfrac{1}{2} + \tfrac{1}{2}\sqrt{\tfrac{1}{2}}} \times \sqrt{\tfrac{1}{2} + \tfrac{1}{2}\sqrt{\tfrac{1}{2} + \tfrac{1}{2}\sqrt{\tfrac{1}{2}}}} \times \&c.$$

Shortly afterwards, Adrianus Romanus, by calculating the length of the side of an equilateral inscribed polygon of 1073741824 sides, determined the value of π to 16 significant figures; and Ludolph von Ceulen, his contemporary, by calculating that of the polygon of 36893488147419103232 sides, arrived (correctly) at 36 significant figures. It is scarcely possible to give, in the present day, an idea of the enormous labour which this mode of procedure entails even when only 8 or 10 figures are sought; and when we consider that Ludolph was ignorant of logarithms, we wonder that a lifetime sufficed for the attainment of such a result by the method he employed.

The value of π was thus determined to $\frac{1}{3 \times 10^{36}}$ of its amount, a fraction of which, after Montucla, we shall attempt to give an idea, thus: Suppose a circle whose radius is the distance of the nearest fixed star (250,000 times the earth's distance from the sun), the error in calculating its circumference by Ludolph's result would be so excessively small a fraction of the diameter of a human hair as to be utterly invisible, not merely under the most powerful microscope yet made; but under any which future generations may be able to construct.

These results were, as we have pointed out, all derived by common arithmetical operations, based on the obvious truth that the circumference of a circle is greater than that of any inscribed, and less than that of any circumscribed polygon. They involve none of those more subtle ideas connected with Limits, Infinitesimals, or Differentials, which seem to render more recent results suspected by modern 'squarers.' If one of that unhappy body would only consider this simple *fact*, he could hardly have the presumption to publish his 3.125, or whatever it may be, as the accurate value of a quantity which by common arithmetical processes, founded on an obvious geometrical truth, was several centuries ago shewn to be greater than

3.14159265358979323846264338327950288,

and less than

3.14159265358979323846264338327950289.

We now know, by far simpler processes, its exact value to more than 600 places of decimals; but the above result of Von Ceulen is much more than sufficient for any possible practical application even in the most delicate calculations in astronomy.

Snellius, Huyghens, Gregory de Saint Vincent, and others, suggested simplifications of the polygon process, which are in reality some of the approximate expressions derived from modern trigonometry.

In 1668 the celebrated James Gregory gave a demonstration of the impossibility of effecting exactly the quadrature of the circle, which, although objected to by Huyghens, is now received as quite satisfactory.

We may merely advert to the speculations of Fermat, Roberval, Cavalleri, Wallis, Newton, and others as to quadrature in general—their most valuable result was the invention of the Differential and Integral Calculus by Newton, under the name of Fluxions and Fluents. Wallis, however, by an ingenious process of interpolation, shewed that

$$\frac{\pi}{4} = \frac{2.4.4.6.6.8.8.10.10.\ \&c.}{3.3.5.5.7.7.9.9.11.\ \&c.}$$

which is interesting, as being the first recorded example of the determination, in a finite form, of the value of the ratio of two infinite products.

Lord Brouncker, being consulted by Wallis as to the value of the above expression, put it

in the form of an infinite continued fraction, thus:

$$\frac{\pi}{4} = \cfrac{1}{1 + \cfrac{1}{2 + \cfrac{9}{2 + \cfrac{25}{2 + \cfrac{49}{2 + \&c.}}}}}$$

in which 2 and the squares of the odd numbers appear. This formula has been employed to shew that not only π, but its square, is incommensurable.

Perhaps the neatest of all the formulas which have been given for the quadrature of the circle, is that of James Gregory for the arc in terms of its tangent—namely,

$$\theta = \tan.\ \theta - \tfrac{1}{3}\tan.\ ^3\theta + \tfrac{1}{5}\tan.\ ^5\theta - \&c.$$

This was appropriated by Leibnitz, and formed perhaps the first of that audacious series of peculations from English mathematicians which have for ever dishonoured the name of a man of real genius.

If we notice that, by ordinary trigonometry, the arc whose tangent is unity (the arc of 45° or $\frac{\pi}{4}$), falls short of four times the arc whose tangent is $\frac{1}{5}$ by an angle whose tangent is $\frac{1}{239}$, we may easily calculate $\frac{\pi}{4}$ to any required number of decimal places by calculating from Gregory's formula the values of the arcs corresponding to $\frac{1}{5}$ and $\frac{1}{239}$ as tangents. And it is, in fact, by a slight modification of this process (which was originally devised by Machin), that π has been obtained, by independent calculators, to 600 decimal places.

It is not yet proved, and it may not be true, that the area or circumference of a circle cannot be expressed in finite terms; if it can be, these must (of course) contain irrational quantities. The integral calculus gives, among hosts of others, the following very simple expression in terms of a definite integral:

$$\frac{\pi}{2} = \int_0^\infty \frac{dx}{1 + x^2}$$

Now it very often happens that the value of a definite integral can be assigned, when that of the general integral cannot; and it is not impossible, so far as is yet known, that the above integral may be expressed in some such form as

$$\sqrt{x} + \sqrt{y},$$

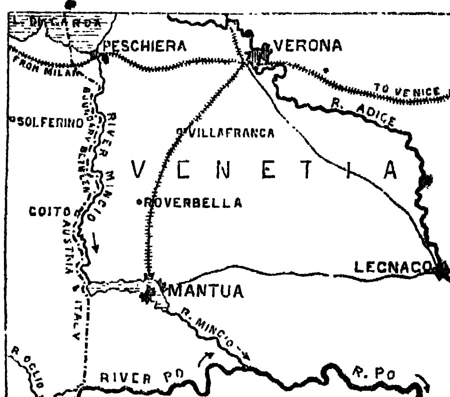
where $\sqrt{x}$ and $\sqrt{y}$ are irrational numbers. Such an expression, if discovered, would undoubtedly be hailed as a solution of the grand problem.

But this, we need hardly say, is *not* the species of solution attempted by 'squarers.' We could easily, from our own experience alone, give numerous instances of their helpless absurdities, but we spare the reader, and refer him, for further information on this painful yet ridiculous subject, to a recent series of papers by De Morgan in the *Athenæum;* and to the very interesting work of Montucla, *Histoire des Recherches sur la Quadrature du Cercle.*

QUADRIE'NNIUM U'TILE, in Scotch Law, means the four years after majority during which a person is entitled to reduce or set aside any deed made to his prejudice during minority. This protection was also given by the Roman law to minors, to enable them to neutralise any unfair advantage that may have been taken of their inexperience during minority. The injury or lesion must have been caused, not by an accident, but by the imprudence or negligence of themselves or of their curators. The proceeding, therefore, must be commenced before the minor attains 25, after which it is too late to seek restitution. See INFANT.

QUADRI'GA. See CHARIOT.

QUADRILA'TERAL, in Military Language, is an expression designating a combination of four fortresses, not necessarily connected together, but mutually supporting each other; and from the fact that if one be attacked, the garrisons of the others, unless carefully observed, will harass the besiegers, rendering it necessary that a very large army should be employed to turn the combined position. As a remarkable instance, and a very powerful one, may be cited the celebrated Austrian quadrilateral in Venetia, comprising the four strong posts of Mantua, Verona, Peschiera, and Legnago. These form a sort of outwork to the bastion which the southern mountains of the Tyrol constitute, and divide the north plain of the Po into two sections by a most powerful barrier. Napoleon III., in 1859, even after the victories of Magenta and Solferino, hesitated to attack this quadrilateral.



The Austrian Quadrilateral.

QUADRI'LLE, a dance of French origin, consisting of consecutive dance movements, generally five in number, danced by couples, or sets of couples, opposite to, and at right angles to each other. The name seems to be derived from its having been originally danced by four couples.

QUADRILLE is a card game, which, as its name denotes, is played by four persons. The number of cards employed is forty, the tens, nines, and eights being discarded from the pack. The rank and order of the cards in each suit vary according as they are or are not trumps, and are different in the black and red suits. The ace of spades, whatever suit be trumps, is always the highest trump, and is called *spadille;* the ace of clubs is always the third highest trump, and is known as *basto;* while the second highest trump, or *manille*, is the deuce of spades or clubs, or the seven of hearts or diamonds, according to the suit which is trumps, it being always of the trump suit. When the black suits are not trumps, the black cards rank as in whist; and when they are trumps, the order is the same, with the exception, as above mentioned, of the deuce, which then (in the trump suit only) becomes manille, the deuce of the black suit which is not trumps retaining its position as the lowest card. When the red suits are not trumps, the order of rank is as follows:

King, queen, knave, ace, deuce, three, four, five, six, seven; but when they are trumps, the ace (of the trump suit only) is raised to the position of the fourth highest trump, under the name of *ponto* or *punto*, and the seven (of the trump suit only) becomes, as previously stated, manille. A little consideration will shew, that when the black suits are trumps, the number of trump cards is eleven, and twelve when a red suit is trumps. The three highest trumps, spadille, manille, and basto, are called *matadores*, and the player who possesses one of them can, if he have no other trumps in his hand, decline to follow suit if trumps are led, provided the trump led is not a matadore of value superior to his own. After the cards have been shuffled, cut, and dealt, the elder hand, on looking at his cards, may, if his hand be weak, decline to play (or *pass*); the next player may do the same, and so on all round; in which case the elder hand must commence, naming the suit which he wishes to be trumps, and the cards are laid, and tricks taken, as in ordinary card games. If a player does not pass, but commences the game by naming trumps and playing a card, he must himself make six tricks to win; and if he succeeds, he obtains the whole of the winnings; but if he loses, he pays the whole of the losses. If he commences the game by 'asking leave'—i. e., to have a partner—which is done by calling a king, the player who holds the king of the suit led must play it when his turn arrives; and he who asked leave, or *l'hombre* (in England generally called *ombre*), along with him who had the king called, or the *friend*, are from this time partners in the game, and divide either the gains or the losses, as the case may be. The ombre and the friend win the game if they make six tricks between them. This game is complicated by a number of conditions, which, under certain circumstances, modify the ordinary mode of playing.

A modification of this game, under the name of *preference*, is much in vogue in Lancashire; and in this country in the beginning of last century, and on the continent—especially in France—the game of *l'hombre*, which is nothing more than quadrille played by three persons, was exceedingly fashionable. L'hombre is now quite obsolete, but a most accurate description of the mode in which it was played will be found in Pope's *Rape of the Lock*. L'hombre was the immediate predecessor of quadrille in popular favour.

QUADRI'VIUM (Lat. *quatuor*, four, and *via*, a road), the name given, in the language of the schools of the West, to the higher course of the medieval studies, from its consisting of four branches, as the lower course for an analogous reason, was called TRIVIUM (q. v.), or 'Three Roads.' The quadrivium consisted of arithmetic, music, geometry, and astronomy. It would carry us beyond our limits to detail the nature and extent of each of these branches as pursued in the medieval schools. The reader will find much curious and new matter on all questions of this nature in the volumes of the works of Roger Bacon, lately edited in the series issued under authority of the Master of the Rolls, as also in the Introduction prefixed to the volumes.

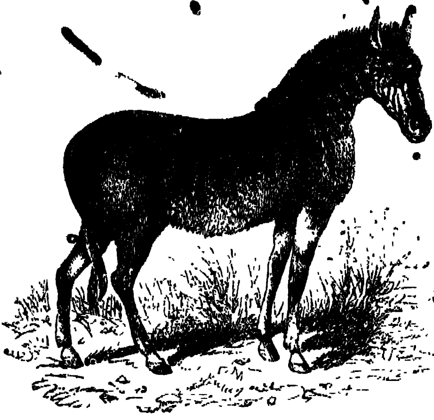
QUADRU'MANA (Lat. four-handed), in the zoological system of Cuvier an order of *Mammalia*, which he places next after *Bimana* (q. v.), and which contains the animals most nearly resembling man in their form and anatomical characters—viz., the monkey and lemur families. The order Q., with the limits assigned to it by Cuvier, is very generally received by naturalists. The name is derived from a character, in which one most obvious difference from man is, that the extremities of all the four limbs are *hands*, or formed for grasping, and not merely those of the anterior ones; these, indeed, being in many of the monkeys less perfect hands than the hinder ones, through the want or rudimentary character of the thumb. None of the Q. are naturally adapted for an erect posture. The differences between man and the apes which most nearly approach him in form, are pointed out in the articles MONKEY, CHIMPANZEE, GORILLA, and ORANG. The Q. resemble man in their dentition more than any other animals. Their other digestive organs also exhibit a general similarity to those of man. The similarity is further apparent in the brain and in the reproductive organs; but in the *Lemuridæ*, a gradual departure from the human form and characters is manifested, with an approach to the ordinary quadruped type.

QUA'DRUPEDS (Lat. four-footed), a term employed both popularly and by scientific writers to designate *four-footed animals*. It is not, however, the name of a class or order in systems of zoology. Popularly, it is almost always limited to those *Mammalia* which have four limbs well developed and formed for walking, and is scarcely ever applied to the *Cetacea*, and rarely even to Seals or to the *Quadrumana* (q. v.). The full development of the limbs, with their termination in *feet* properly so called, thus appears to be by no means one of the most important characters by which groups of animals are distinguished; and this further appears when the same character is found again, in great perfection, in a lower class of vertebrate animals—in Chelonian and Saurian Reptiles, as tortoises and lizards. But the *four-limbed* type prevails among vertebrate animals, from man downwards; so that even in serpents, in which it is least notable, traces of it appear on anatomical examination, as in Boas (q. v.); and there are many creatures which form connecting links as to this character between serpents and those reptiles—as crocodiles and lizards—which possess it in greatest perfection. The homology of certain fins of fishes with the limbs of quadrupeds is noticed in the article FISHES. No approach to the four-limbed type is found among Invertebrate animals.

QUA'DRUPLE ALLIANCE. See ALLIANCE.

QUÆ'STOR (Lat. contr. from *quæsitor*, a searcher or investigator, from *quæro*, to seek or search into) was anciently the title of a class of Roman magistrates, reaching as far back, according to all accounts, as the period of the Kings. The oldest quæstors were the *quæstores parricidii* ('trackers of murder,' ultimately public accusers), who were two in number. Their office was to conduct the prosecution of persons accused of murder, and to execute the sentence that might be pronounced. They ceased to exist as early as 366 B.C., when their functions were transferred to the *Triumviri Capitales*. But a far more important though later magistracy was the *quæstores classici*, to whom was intrusted the charge of the public treasury. The exact date of their institution cannot be ascertained, but it was subsequent to the expulsion of the kings. They appear to have derived the epithet of *classici* from their having been originally elected by the centuries. At first they were only two in number, but in 421 B.C. two more were added. Shortly after the breaking out of the first Punic War, the number was increased to eight; and as province after province was added to the Roman Republic, they amounted, in the time of Sulla, to twenty, and in the time of Cæsar to forty. On its first institution the quæstorship (*quæstura*) was open only to patricians; but after 421 B.C., plebeians also became eligible.

QUAGGA (*Equus*—or *Asinus—Quagga*), an animal of the family *Equidæ* (q. v.), a native of the southern parts of Africa, rather smaller than the Zebra (q. v.), with the hinder parts higher, and the ears shorter; the head, mane, neck, and shoulders blackish-brown, banded with white; similar bands towards the rump, gradually becoming less



Quagga (*Asinus Quagga*).

distinct; a black line running along the spine. The Q. receives its name from its voice, which somewhat resembles the barking of a dog. It is more easily domesticated than the zebra, and a curricle drawn by quaggas has been seen in Hyde Park. In its wild state it does not associate with the zebra, although inhabiting the same plains. Hybrids, or mules, have been produced between the horse and quagga.

QUAIL (*Coturnix*), a genus of gallinaceous birds of the family *Tetraonidæ*, nearly allied to partridges, but having a more slender bill, a shorter tail, longer wings, no spur, and no red space above the eye. The first and second quills of the wing are about as long as the third, which is the longest in the more rounded wing of the partridges. Quails, therefore,



Common Quail (*Coturnix vulgaris*).

far excel partridges in their power of flight. The tail is very short. They never perch on trees, but always alight on the ground. They are among the smallest of gallinaceous birds.—The COMMON Q. (*C. vulgaris* or *C. dactylisonans*) is found in most parts of Europe, Asia, and Africa. In India and other warm countries, it is a permanent resident; but in many countries it is a bird of passage; and thus it visits the north of Europe, and at certain seasons appears in vast multitudes on the coasts and islands of the Mediterranean, so that quails are there taken in hundreds of thousands in their northern and southern migrations. The Q. is not plentiful at any season in any part of Britain; but sometimes appears even in the northern parts of Scotland, and more frequently in the south of England, where it is sometimes seen even in winter. There is reason to believe that the food miraculously supplied to the Israelites in the wilderness was this very species of bird, to which the name *Selav*, used in the Mosaic narrative, seems to belong.—The Q. is fully 7 inches in entire length; of a brown colour, streaked with different shades, and the wings mottled with light-brown; the throat white, with dark-brown bands in the male, and a black patch beneath the white, the lower parts yellowish-white. The Q. is polygamous. The nest is a mere hole in the ground, with 7 to 12 eggs. The Q. is highly esteemed for the table. Great numbers of quails are brought from the continent to the London market.—Other species of Q. are found in different parts of Asia, although no other is so abundant as the Common Q., and none migrates as it does.—The Coromandel Q. (*C. textilis*) is a very pretty little bird, rather smaller than the Common Quail. —The Chinese Q. (*C. excalfactoria*), a very beautiful little species, only about 4 inches long, is abundant in China, and is there kept for fighting, the males being very pugnacious, like those of other polygamous birds, and much money is lost and won on the combats of these quails. It is also used for a singular purpose—the warming of the hands of its owner.

QUAKERS; the ordinary designation of the Society of Friends (q. v.). In respect of law, Quakers differ from the rest of their fellow-citizens chiefly as regards their marriages and their taking of oaths. Thus, though the English marriage acts required all marriages to take place in a consecrated church of the establishment, before the dissenters obtained a relaxation of the law, the Quakers' marriages were excepted, and marriages between two Quakers were allowed to be solemnised according to the usages of their own sect. As regards Quakers in the matter of taking oaths, it is expressly provided by several statutes, that instead of taking an oath in the usual way, they may make an affirmation instead, whether as witness in a court of justice, or as holding a civil office, the qualification for which office is the taking of an oath. The penalties of perjury, however, attach to a false affirmation in the same way as to a false oath. With regard to church-rates, it has been recently decided that Quakers stand on the same footing as other people in respect of their liability to pay church-rates, and the mode of disputing the validity of the rate.

QUAKING GRASS (*Briza*), a genus of grasses, having a loose panicle; drooping spikelets, generally remarkable for their broad and compressed form, suspended by most delicate footstalks, and tremulous in every breath of wind; the spikelets with two glumes and numerous florets, the florets having each two awnless paleæ, which become incorporated with the seed. The species are few, and mostly European. They are all very beautiful. *B. maxima*, a native of the south of Europe, is often planted in flower-gardens. *B. media*, the only species common in Britain, growing in almost all kinds of poor soil, from the sea-coast to an elevation of 1500 feet, is of some value as a pasture-grass, being very nutritious, although the quantity of herbage is scanty. The value of many poor pastures very much depends on it; but when they are enriched by manures, it generally disappears. It is sometimes sown by farmers, but not nearly to such an extent as it would be if its seed did not

lose vitality so quickly that only a small proportion



Quaking Grass (*Briza media*).

grows, if it is not sown in autumn when newly ripened.

QUAMASH, or BISCUIT ROOT (*Camassia esculenta*), a plant of the natural order *Liliaceæ*, nearly allied to squills and hyacinths. It is a North American plant, abounding on the great prairies west of the Mississippi. The roasted bulbs are agreeable and nutritious, and are much used as an article of food.

QUANTIFICATION OF THE PREDICATE, a phrase belonging to Logic, and introduced by Sir W. Hamilton to express the characteristic feature of certain logical doctrines of his respecting the Proposition and the Syllogism.

According to the Aristotelian Logic, propositions are divided, according to their *quality*, into affirmative and negative ('The sun has set,' 'The sun has *not* set'); and, according to their QUANTITY, into universal and particular ('*All* men are mortal,' '*Some* men live eighty years'). If we combine the two divisions, we obtain four kinds of propositions—Affirmative Universal ('All men are mortal'), Affirmative Particular ('Some men live to eighty'), Negative Universal ('No men are omnipotent'), Negative Particular ('Some men are not wise').

Now, it is remarked by Sir W. Hamilton, that the statement of the QUANTITY of these various propositions is left incomplete; only the *subject* of each has its quantity expressed (*all* men, *some* men, *no* men); while there is implied or understood in every case a certain quantity of the *predicate*. Thus, 'All men are mortal,' is not fully stated; the meaning is, that all men are *a part* of mortal things, there being (possibly and probably) other mortal things besides men. Let this meaning be expressed, and we have a complete proposition to this effect: '*All* men are *some* (or part of) mortals,' where quantity is assigned, not only to the subject, but also to the predicate. It might be that the predicate contained under it only the subject, as in the proposition: 'All matter gravitates.' There is no other thing in the universe except matter that obeys the law of gravitation. Knowing this, we might quantify the predicate accordingly: '*All* matter, is *all* gravitating things,' a kind of proposition not recognised in the old logic. Another original form of proposition, brought out by supplying the quantity of the predicate, is, '*Some* A is *all* B;' '*Some* men are *all* Englishmen.' So that, instead of two kinds of propositions under affirmation, Sir W. Hamilton's system gives four. In the same way, he increases the number of negative propositions. 1. For 'No man is omnipotent,' he writes, quantifying the predicate, '*Any* man is not *any* omnipotent;' or, '*All* men are out of *all* omnipotent things.' 2. 'Some men are not young' is fully quantified; 'Some men are not *any* young things;' 'Some men are out of *all* young things.' These two (in their unquantified shape) are the ordinarily recognised propositions of the negative class. To them Sir W. Hamilton adds—3. '*All* men are not *some* animals,' 'All men are excluded from a certain division of the class animal;' and 4. '*Some* animals are not *some* men;' 'A portion of the animals is not included in a portion of men.'

The first result, therefore, of completing the statement of a proposition by inserting what Hamilton considers as implied in the thought—namely, the quantity of the predicate—is to give eight kinds of propositions instead of four. The next result is to modify the process called the Conversion of Propositions. See CONVERSE. The kind of conversion called *limitation* (All A is B, *some* B is A) is resolved into simple conversion, or mere transposition of premises without further change. 'All A is *some* B;' 'Some B is all A.'

The multiplication of varieties of propositions is attended with the further consequence of greatly increasing the number of *syllogisms*, or forms of deductive reasoning. See SYLLOGISM. In the scholastic logic, as usually expounded, there are nineteen such forms, distributed under four figures (four in the first, four in the second, six in the third, five in the fourth). By ringing the changes on eight sorts of propositions, instead of the old number, four, *thirty-six* valid syllogisms can be formed in the first figure. Whether the increase serves any practical object, is another question.

Sir W. Hamilton also considers that he has been led, by the new system, to a simplification of the fundamental laws of the syllogism, or, as he expresses it, 'the reduction of all the *General Laws of Categorical Syllogisms* to a *Single Canon*.'

Professor De Morgan, in his elaborate system of *Formal Logic*, has also invented and carried out into great detail a plan of expressing the quantity of the predicate; but he does not admit the whole of Hamilton's eight propositional forms, rejecting in particular the last mentioned in the above enumeration. He also increases the number of valid syllogisms as compared with the old logic. Not content with indicating that the predicate has quantity as well as the subject, he supposes the possibility of a *numerical estimate* of quantity in both terms of the proposition, and from this draws a new set of inferences. Thus, if 60 per cent. of B are included in C, and 70 per cent. in A, 30 per cent. at least of B must be found both in A and in C.—See Sir W. Hamilton's *Discussions;* Spencer Baynes's *New Analytic of Logical Forms;* De Morgan's *Formal Logic;* Mill's *Logic*, under the Syllogism; and his *Examination of Sir W. Hamilton's Philosophy.*

QUAQUAVERSAL (Lat. turning every way), a term applied in Geology to the dip of the Stratified rocks when arranged in dome-shaped elevations, or basin-shaped depressions, whereby the beds have an inclination on all sides to one point, that point being the summit of the dome in the one case, and the lowest level of the basin in the other.

QUARANTINE (from the Fr. *quarantaine*, a period of 40 days) is a forced abstinence from communication with the shore, which ships are compelled to undergo when they are last from some port or country where certain diseases held to be infectious, as yellow fever, plague, or cholera, are or have been raging. Where a quarantine is established, it is a high misdemeanour for any person in the suspected ship to come on shore, or for any one to disembark any merchandise or goods from her. The countries on the eastern and southern shores of the Mediterranean are those most commonly held to be infectious, and, as a regular arrangement, ships from them have to pass quarantine at Malta, or some French, Italian, or Spanish port. In England, the quarantine laws were, until about 20 years ago, enforced with severity; but now a quarantine is an unusual occurrence, although the power to enact it rests with the crown, and it is occasionally imposed by an order in Council. In Mediterranean ports, quarantine ordinarily lasts from 6 to 15 days, though it sometimes extends to a much longer period, during which the passengers are imprisoned in a sort of barrack called a 'lazaretto,' and the contents of the ship—animals, goods, and letters—are fumigated, punctured, sometimes immersed in water, or even acid, and all possible means are adopted to destroy infection.

Quarantine is not of necessity limited to a sea-frontier; and it is enforced—often with absurd rigour—at the frontiers between contiguous states, especially in Eastern Europe, to the annoyance of travellers, and to the serious detriment of commerce.

History declares quarantine regulations for maritime intercourse to have been first established by the Venetians in 1127 A. D.; but the practice must have been greatly older on land-frontiers; and the precautions of the Jews against leprosy indicate that a species of quarantine was enforced by them. The law for regulating quarantine, when imposed in England, is 6 Geo. IV. c. 78.

QUA'RÉ I'MPEDIT is the title of an English action, whereby a person who has purchased an advowson, or right of presentation to an ecclesiastical benefice, sues any one who disturbs or hinders him in the exercise of his legal right.

QUA'RREL, or QUARRY, a pane of glass of a lozenge or diamond shape. The name is also applied to a perforation or window of this form, and to square or diamond-shaped paving-stones or tiles.

QUA'RRY (Fr. *carrière*). When any useful rock is worked in an open manner at the surface of the earth, the excavation is called a quarry. Quarrying differs little from mining in principle, except that the latter is essentially an underground operation.

From a very remote period, famous granite quarries have been worked at Syene, and others of sandstone and limestone, along the banks of the Nile, for the temples and monuments of ancient Egypt. Greece found the materials for her white marble temples in the quarries of Mount Pentelicus, near Athens, and in those of the islands of the Archipelago. It was from the quarries of Travertine (a kind of limestone), at Tibur, that ancient Rome was chiefly built. Italy has long been celebrated for her marble quarries, those of Tuscany yielding the most esteemed kinds. The fine saccharoid marbles for statuary and other fine-art purposes, are exclusively obtained from the Apuan Alps, which rise around Carrara, Massa, and Seravezza. Those of Carrara, especially, are highly prized all over the world. From the quarries at Seravezza, marble to the value of £150,000 has been recently taken for the splendid cathedral of St Isaac at St Petersburg alone.

Of the more celebrated quarries of the British Islands, we may mention those of Cornwall, Aberdeen, and Wicklow for granite; those in the neighbourhood of Edinburgh, Glasgow, and Newcastle, for sandstone; those near Bristol and Doncaster, and in the Isle of Portland, for limestone; those of Derbyshire, Devonshire, Kilkenny and Galway, for marbles; and those of North Wales and Argyleshire for slates.

To understand the operations of the quarryman, it is necessary to bear in mind that all rocks belong to one or other of two great classes, namely, the stratified and the unstratified. The former are sedimentary rocks, occurring in parallel beds or strata, and consist chiefly, in so far as we are at present concerned, of sandstone and limestone. Unstratified or igneous rocks, which include greenstone or whinstone, granite, porphyry, &c., have no distinct bedding, that is, they do not lie in separate layers. Roofing-slate is a stratified rock, but it splits into thinner laminæ in the direction of its *cleavage* than in the direction of its bedding, the former being often at right angles to the latter. Granite and other igneous rocks have also a natural jointage or cleavage, although they are not stratified. Advantage is taken of these peculiarities in quarrying the different rocks, but in the main the systems adopted do not greatly differ.

Stones are most frequently separated from their native rock by blasting with gunpowder. This operation is described in detail under BLASTING; see also GALVANISM and SAFETY-FUSE. Of late the practice of boring jumper-holes with engine-power has been introduced, and wherever it can be conveniently applied, must be a great improvement on the slow and tedious process of boring by hand. See TUNNEL.

With some stratified rocks, such as sandstone, a good many of the best stones are procured without the aid of gunpowder. Hand-tools are alone used, because blasting is apt to cause rents, and otherwise shatter portions which it is desirable to keep solid. By this method, the quarryman makes a number of small holes with a pick, along a certain length of rock, into which steel wedges are inserted. After a succession of blows with heavy hammers, the wedges at length cut through the stratum. Blocks for columns, obelisks, tombstones, &c., are best procured in this way. It may also be stated that these are obtained from those more valuable parts of sandstone deposits technically termed 'liver rock,' which consist of the thicker and more consolidated strata. Flagstones and other pieces of limited thickness are quarried from the thinner beds termed 'bed rock.'

When stones are removed in masses by blasting or otherwise, they have still to be quarried into shape, according to the purpose for which the various pieces are best suited. Thus, in an ordinary building-stone quarry, the larger stones (after those of unusual size and quality are selected for the purposes named above) are roughly formed into ashlar, window-sills, lintels, rybats, corners, steps, and the like, by means of such tools as picks, hammers of various kinds, and wedges. The small irregular-shaped pieces are called *rubble*, and are used for the commonest kind of building. Slates are split up into the thickness used for roofing, by means of a mallet and broad chisel. In granite quarries worked for paving-stones, as has been incidentally alluded to above, the loss of material in reducing the blocks to the size and shape required, is enormous, as much as four-fifths of the whole being commonly wasted. Besides the tools already mentioned, long iron bars called *pinches*, and powerful cranes for turning and lifting the larger stones,

are nearly all the implements required by the quarry-master.

In quarrying, as well as in mining, much of the cost is incurred for the pumping of water from the workings. A good steam-engine and set of pumps are therefore indispensable for every quarry of any extent. Much expense is also every now and then incurred in clearing away sand, gravel, and other loose débris from the upper bed of the rock. This, which is called 'drift' by geologists, and 'tirring' in some localities by quarrymen, often becomes suddenly very deep, especially where the beds dip at a high angle, and is an obstacle by which many quarries of stratified rock are sooner or later arrested.

QUARRIES, in point of law, belong to the person who is owner of the freehold or inheritance of the land, the maxim being, that the owner is entitled to the soil down to the centre of the earth. No person, therefore, is entitled to work a quarry or carry away the materials unless he derives his right from the owner by lease or other legal title, for the stones or materials are part of the soil, and belong to the freeholder.

QUART, a measure of capacity, and the fourth part of a Gallon (q. v.). The word is nothing more than the common word 'quarter,' a fourth part. The ordinary *quart-bottle* is a deception, containing only the sixth part of a gallon, and often less.

QUARTAN FEVER. See AGUE.

QUARTER, the name of two measures in use throughout the United Kingdom, one of them a measure of weight, and the other of capacity. The former is denominated a quarter from its being the fourth part of a hundredweight, and contains 28 lbs. avoirdupois; the capacity measure of the same name is said by some to have been so called from its being the fourth part of a 'chaldron,' but, as it happens, the quarter does not always bear this relation to the chaldron. As the porphyry coffer in the King's Chamber of the Great Pyramid (see PYRAMID) is said to be almost accurately the quadruple of the English quarter, the bold theory has been advanced that this is the origin of the measure and the name (see *Our Inheritance in the Great Pyramid*, by Piazzi Smyth). The quarter contains 8 bushels, of 4 pecks each. See BUSHEL.

QUARTER, in Heraldry, a subordinary consisting of the upper dexter fourth part of the shield, cut off by a vertical and a horizontal line meeting in the centre of the shield. When two or more coats are marshalled together on a shield divided into squares for their reception, such divisions are also called quarters. See QUARTERING.

Quarter.

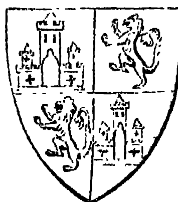
QUARTER, in War, signifies the sparing of the life of a vanquished enemy, which by the laws of war is forfeit to the victor. The expression seems to be derived from the use of the word 'quarter' to designate the lodging of the particular warrior; to *give quarter* to a prisoner being to send him to his captor's quarter for liberation, ransom, or slavery. The refusal of quarter is a terrible aggravation of the horrors of war, and is only at all justifiable towards an enemy who has been guilty of atrocious cruelty himself or of some flagrant breach of faith.

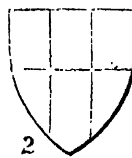
On shipboard, a quarter is the stern portion of each of the ship's sides. The extent of the quarter is arbitrary, but it is generally held to comprise about one-fifth of the ship's length.

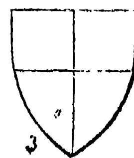
QUARTER-DAYS are the days adopted between landlord and tenant for entering or quitting lands or houses and for paying rent. The origin of these periods is no doubt due entirely to convenience, and though in England they are unknown to the common law, yet now they are almost part and parcel of every agreement made between parties as to the letting of houses and land. In England, if nothing is said as to the time of payment of rent, it is due only once a year, and the first payment is due at the end of a year from the time of entry. But, owing to the convenience of the usual quarter-days, they are commonly referred to, and thereby imported into the contract. Thus, it is usual to enter and leave houses either at one of the four ordinary quarter-days, or where it is so arranged at half-quarter-days, and these points of time are fixed upon for the convenience of calculating rent. Rent of houses is generally made payable quarterly on the usual quarter-days. These are, in England and Ireland, Lady Day, March 25; Midsummer Day, June 24; Michaelmas Day, September 29; and Christmas Day, December 25. In Scotland, there are what are called two legal terms in each year, and two conventional terms, the latter being only adopted when expressly so agreed. The legal terms are Whitsunday, May 15, and Martinmas, November 11; and the conventional terms are Candlemas, February 2, and Lammas, August 1. The law of Scotland differs from that of England in this, that if nothing is said between the parties on letting houses and lands, these legal terms are impliedly included as part of the agreement, both as regards time of entry and payment of rent. Thus, as to houses and grass-lands, the legal term of entry is Whitsunday, and that of entry to arable land is Martinmas. So the rent is presumed to be payable twice a year at those legal terms, if nothing is said to the contrary.

QUARTER-DECK of a ship is an upper deck extending from the main-mast to the poop, or, when there is no poop, from the main-mast to the stern. It is used as a promenade by the officers only, and, in a ship-of-war, no person—officer or otherwise—enters upon it without touching his hat in token of salute. When the captain addresses his men, or confers public distinction on any individual, the crew are summoned aft on the quarter-deck.

QUARTERING, in Heraldry, is the bearing of two or more coats on a shield divided by horizontal and perpendicular lines, a practice not to be found in the earlier heraldry, and little in use till the 15th century. Arms may be quartered for various reasons. 1. To indicate dominion. A sovereign quarters the ensigns of his different states. The earliest instance of quartering in England is found in the paternal arms of Eleanor, daughter of Frederick III., king of Castile and Leon, and first wife of Edward I., as represented on her tomb in







Quartering.

Westminster Abbey—the castle of Castile occupying the first and fourth quarters, and the lion of Leon the second and third. The arms of England and

Ponthieu are similarly quartered on the same monument, and on the crosses erected to Queen Eleanor's memory. The received rule regarding the quartering of the ensigns of different states is, that precedence is given to the most ancient, unless it be inferior in importance. Feudal arms are sometimes quartered in the same way by subjects. 2. Arms of augmentation or special concession accorded to a subject by his sovereign, by way of honour, are sometimes granted to be borne quarterly with the paternal arms. These generally contain a portion of the royal insignia, and have precedence of the paternal coat. 3. The most usual reason for quartering is to indicate descent from an heiress who has intermarried into the family. Where there is but one heiress, her coat occupies the second and third quarter of the shield, and the paternal arms the first and fourth. Where there are more than one, they are marshalled in the successive quarters in the order of the intermarriages. Where more than four coats have to be marshalled, the number of vertical lines is increased, and the divisions, though more than four, are still called quarters. Where there is an odd number of coats, the last quarter is usually filled up by repeating the first. One of the quarters may itself be quartered, when the heiress was entitled to bear a quartered coat; the shield is then said to be counter-quartered, and its primary quarters are called *grand quarters*. Quarterings are not allowed to be added to the paternal coat without the sanction of the heraldic authorities.

The expression 'quarterings' is often loosely used for *descents* in cases where there is no right to quarter from representation. The eight or sixteen quarterings which are sometimes ranged round the Scottish funeral escutcheon, and which are still important for many purposes in Germany, have no reference to representation, but imply purity of blood for four or five generations; i. e., that the father and mother, the two grandmothers, and four great-grandmothers, as also in the case of sixteen quarterings, the eight great-great-grandmothers, have all been entitled to coat-armour.

QUA'RTERMASTER. In the Army, the *quartermaster-general* is a staff-officer of high rank, whose duty it is to arrange the marches, quarters, and internal arrangements of the army to which he belongs. Every army has some officer of this department; from a brigade with a deputy-assistant-quartermaster-general, receiving £173, 7*s*. 6*d*. a year besides regimental pay, up to a complete army under a commander-in-chief, with a quartermaster-general, who is usually a general officer, and receives £691, 19*s*. 7*d*. per annum, besides his other pay. At headquarters, there is a permanent quartermaster-general, responsible for all the movements of the army, the organisation of expeditions, camps of instruction, &c. He receives £1383, 19*s*. 2*d*., besides his pay as a general officer, and has an office at the Horse Guards, for which the charge is, exclusive of his own emoluments, in 1864—1865, £4940.

The *quartermaster* is an officer on the staff of each regiment, in which he holds the relative rank of lieutenant. His duties are to superintend, assign to their respective occupants, and have charge of, quarters, barracks, tents, &c., used by the regiment. He is also regimental storekeeper. He rises, with scarcely an exception, from the ranks, the experience of an old sergeant being considered highly useful in the office. The quartermaster has no further promotion to look forward to; but after 30 years' service in all—including 10 as an officer—he may retire with the honorary rank of captain. He receives 8*s*. a day in the cavalry, and 6*s*. 6*d*. in the infantry, rising by length of service to 11*s*. 6*d*. and 10*s*. respectively. He is not required to join the mess. The *quartermaster-sergeant* is a non-commissioned officer appointed to assist the quartermaster in his various duties. He receives daily 3*s*. 2*d*. in the cavalry, 3*s*. 9½*d*. in the artillery, 2*s*. 8*d*. in the infantry of the line.

In the Navy, the *quartermasters* are certain petty officers appointed in each ship by the captain to have charge of the stowage of ballast and provisions, of coiling ropes, attending to the steering, keeping time by the sand-glasses, &c. The principal of these men is called the ship's quartermaster, and receives £41, 1*s*. 3*d*. per annum, if engaged for continuous service; £36, 10*s*., if otherwise.

QUA'RTERN is a term frequently employed in some parts of Great Britain to designate the fourth part of a peck; and in liquid measure, it is the fourth part of a pint, and is synonymous with the imperial gill.

QUARTERS, in Naval and Military affairs, are, generally, the positions assigned to persons or bodies of men. In a more special sense, the quarters in the army are the places of lodging assigned to officers or men, when not actually on duty. *Head-quarters* is the quarter of the commanding officer of a force, or of a section of a force. The head-quarters of the whole British army is at the Horse Guards, where the commander-in-chief has his permanent offices.

In the *Navy*, quarters has the special meaning of the positions to be taken by every man in actual combat.

QUARTERS, the upright posts of timber-partitions, &c., used for lathing upon. They do not exceed 4 inches square, and are generally about 4½ inches by 2 inches, and are placed from 12 to 14 inches apart.

QUARTER SESSIONS, in England, is a court or meeting of justices of the peace, who assemble every quarter of the year, for judicial as well as miscellaneous business. The meetings are fixed by statute to be held in the first full week after December 28, March 31, June 24, and October 11, respectively; often otherwise called the Epiphany, Easter, Trinity, and Michaelmas Sessions. The chief officer of the Court of Quarter Sessions is the *custos rotulorum*, so called because he is intrusted with the custody of the records and rolls. He is always one of the justices of the peace of the county or riding, nominated by the crown, and appointed by the commission. His deputy is the clerk of the peace, who acts also as clerk to the Court of Quarter Sessions. The jurisdiction of the Court of Quarter Sessions is confined to criminal business, and is very important. It includes all criminal offences whatever, except the highest classes; thus, it has no jurisdiction to try for treason, murder, or capital felony, or blasphemy, perjury, forgery, arson, bigamy, abduction of women or girls, concealment of birth, offences against the Queen's title or the bankrupt laws, bribery, blasphemous, seditious, or defamatory libels, unlawful combinations or conspiracies, stealing or destroying wills or records. Besides its jurisdiction in criminal offences, there are numerous miscellaneous matters of which the Court has cognizance, including appeals from petty Sessions, and from justices in special sessions, on a great variety of subjects, as to convictions of vagrants, stopping up highways, removal of paupers, &c. The justices who do the work of Quarter Sessions are all unpaid, and thus save the country much expense. They generally choose a chairman of their own body to preside regularly at these courts, which office is considered a great honour,

and is generally given to an able practical man, well versed in business.

This plan, however, of unpaid judges has been found inexpedient in boroughs and large towns, where the justices of the peace, being appointed chiefly from successful tradesmen, are not possessed of the necessary education to secure the efficient performance of like duties. There is therefore appointed for every borough in England a Recorder, who is a barrister, appointed by the Home Secretary, and is paid by salary out of the borough fund—a salary, however, very trifling in amount. His duty is confined to trying prisoners and other judicial business, and he is in fact, in his own person, the Court of Quarter Sessions for boroughs. There is also an exception to unpaid judges of Quarter Sessions in the county of Middlesex, where a barrister is appointed to act in the trial of prisoners, and called the assistant judge, being the official chairman of the Middlesex Sessions. The routine of business at Quarter Sessions consists of the trial of offenders, the trial of appeals, and the hearing of motions upon different subjects. Sometimes a second court sits, consisting of some of the justices appointed by the whole court, whenever the business is unusually heavy. In Scotland, there is also a Court of Quarter Sessions of the peace, held four times a year at the county town—viz., on the first Tuesdays in May, August, and March, and the last Tuesday in October. At these courts, the justices have power to review the sentences of special and petty sessions. But these courts are of a trifling description compared to the courts of the same name in England. In Scotland, the judicial business which in England devolves on Courts of Quarter Sessions, is chiefly disposed of by the sheriff of the county.

QUARTER-STAFF, formerly a favourite weapon with the English for hand-to-hand encounters, was a stout pole of heavy wood, about 6½ feet long, shod with iron at both ends. It was grasped in the middle by one hand, and the attack was made by giving it a rapid circular motion, which brought the loaded ends on the adversary at unexpected points.

QUA'RTETT, a piece of music arranged for four voices or instruments, in which all the parts are *obligati*, i. e., no one can be omitted without injuring the proper effect of the composition. Vocal quartetts are generally accompanied by instruments to sustain the voices. A mere interchange of melody, by which the parts become in turn principal and subordinate, without any interweaving of them, does not constitute a quartett. Quartetts for stringed instruments are generally arranged for two violins, a tenor violin, and violoncello. The most important quartetts have been composed by Haydn, Mozart, Beethoven, Spohr, and Onslow.

QUA'RTILE. See ASPECTS.

QUA'RTO-DE'CIMANS, those who, after the final decision of the Council of Nicæa, continued to hold that it was obligatory on Christians to celebrate Easter on the 14th day of the first lunar month near the vernal equinox, *whether that 14th day fell on Sunday or not*, or who, even before the Council of Nicæa, held the observance of the Jewish Passover to be of obligation. The controversies as to the celebration of Easter have been briefly described under the head EASTER (q. v.).

QUARTZ, a mineral, which is essentially *Silicic Acid*, or *Oxide of Silicon* (see SILICON), although it is often combined or mixed with other substances. It is a very abundant and widely-diffused mineral. It is almost the sole constituent of quartz rock, in which gold is far more frequently found than in any other matrix; and it is a principal constituent of granite, syenite, protogine, eurite, pegmatite, granulite, elvanite, all the different kinds of sandstone, and many other rocks. It is also a common mineral in trap-rocks, limestone, &c., and the sands of the sea-shore and of deserts are chiefly formed of it. It is found both massive and crystallised; the primary form of the crystals is a rhomboid, but it far more frequently occurs in six-sided prisms, terminated by six-sided pyramids; or in six-sided pyramids; or sometimes in dodecahedrons, formed by six-sided pyramids base to base. It is hard enough to scratch glass easily, and it gives fire with steel. It becomes positively electrical by friction; and two pieces, rubbed together, give light in the dark. When pure, it is quite colourless; but, owing to the presence of foreign substances, it often exhibits great variety of colours; and many minerals, known by different names, and consisting chiefly of quartz, have little or nothing to distinguish them but their colour. Thus Rock Crystal, Chalcedony, Carnelian, Cairngorm, Agate, Amethyst, Prase, Chrysoprase, Jasper, &c., are mere varieties of quartz. Opal (q. v.) is very nearly allied to it.

Quartz Rock, or *Quartzite*, is a sedimentary sandstone, converted into a very hard, compact rock by metamorphic action. It is distinctly granular; the grains, however, seem to melt into each other, or to be enveloped in a homogeneous silicious paste. It is frequently brittle, and in weathering, it breaks up into small irregular cubes.

Quartz Veins occur in metamorphic rocks. The structure of the veins is compact and homogeneous, and very different from that of quartzite. Veins not only differ in width, but the same vein is very variable throughout its course, sometimes thinning to a very fine film, and then swelling out to great thicknesses. Quartz veins are more metalliferous than the mass of the rocks in which they occur. They are the principal natural repositories of gold, for though the precious metal is chiefly obtained from alluvial sands and gravels, these are the weathered and abraded fragments of the under-lying, or neighbouring Palæozoic rocks. Small quantities of gold have been found in the quartz veins traversing the Silurian and Cambrian rocks of Wales and Scotland; and in Victoria, the great veins are so highly auriferous, that they are mined for the precious metal. Wherever the Lower Silurian rocks make their appearance on the surface throughout the colony, they are everywhere intersected by enormous numbers of quartz veins, which often reach a thickness of 10 to 15 feet. As yet, only a very small proportion of these have been explored; but the results have been so remunerative, that mining in the solid rock for gold is extensively pursued. One mine has been driven to a depth of 400 feet, and, contrary to the generally-received opinion, the vein at this depth continued to be auriferous.

QUASIMODO SUNDAY, called also DOMINICA IN ALBIS, the first Sunday after Easter. The name Q. S. is taken from the first words of the Introit (1 Peter, ii. 2) of the mass of the day. The name *Dominica in Albis* is derived from the custom which was formerly observed of the neophytes who had been baptised at Easter appearing in white garments in the church.

QUASS, a sort of weak beer produced in Russia by fermenting rye-meal in warm water. It is usually bottled in stone bottles, and is a favourite beverage with the people generally. When it becomes too sour, it is used as vinegar.

QUA'SSIA, a genus of trees and shrubs of the natural order *Simarubaceæ* (q. v.); having hermaphrodite flowers, with five petals combined into a

tube, and much longer than the small calyx, ten stamens, five germens, and only one style; the fruit composed of five drupes. *Q. amara* is a native of the tropical parts of America, and of some of the West India Islands. It is a shrub of 10—15 feet high, with racemes of bright-red flowers, and large pinnate leaves, the stalks of which are remarkably winged and jointed. The wood, and particularly that of the root, has a very strong bitter taste, and was at one time much used in medicine under the names of *Q.-wood*, *Bitterwood*, &c. The flowers were valued in Surinam for their stomachic properties, as early as the beginning of the 18th c.; the wood of the root began to be known in Europe before the middle of that century, and was more fully brought into notice about 1756, by Rolander, a Swede, who had visited Surinam, and had learned its value from a negro, called Quassi, or Quasha. This negro had employed it with great success as a remedy for fevers, and although, as Rolander says, a very simple man, had acquired a great reputation by his use of it. Linnæus published a dissertation on it in 1763, and it was he who gave to the genus the name Quassia, from the name of the slave by whom its medicinal qualities had been made known. The true Q. is now, however, little used; its name having been transferred to the Bitterwood (q. v.) of the West Indies, *Picræna* (or *Simaruba*) *excelsa*, a lofty tree, the wood of which possesses the same properties, although in an inferior degree; but this inferiority is compensated by the greater facility with which any requisite supply is obtained. It is the wood of this tree which is now sold as *Q.-wood*, or *Q.-chips*, in the shops. It is used to a considerable extent instead of hops for making beer, although the use of it is illegal in Britain, and beer made with it is said to become muddy and flat, and not to keep. Q.-wood is narcotic, and a decoction of it is used for killing flies. Cabinet-work made of it is safe from all attacks of insects. In medicine, it is a valuable tonic; but in fevers, it is not to be compared with Peruvian bark and its alkaloids. Its properties depend chiefly on a bitter principle, called *Quassite* or *Quassin*.

QUATE'RNARY, a term employed by some French and English geologists to characterise the Post-tertiary strata, which they group together into an epoch of equal value with the three great divisions of Primary, Secondary, and Tertiary. The deposits included under the name will be found described under the Pleistocene and Recent strata, to which we refer the reader.

QUATE'RNIONS, the name given by its inventor, Sir W. R. Hamilton (q. v), to one of the most remarkable of the mathematical methods or calculi, which have so enormously extended the range of analysis, while simplifying its application to the most formidable problems in geometry and physics.

It would be inconsistent with our plan to give even a complete though elementary analytical view of this calculus; but it is possible, by means of elementary geometry and algebra alone, to give the reader a notion of its nature and value.

For this purpose, it will be necessary to consider some very simple, but important, ideas with reference to the *relative position* of points in space. Suppose A and B to be any two stations, one, for instance, at the top of a mountain, the other at the bottom of a coal-pit. *Upon how many distinct numbers does their relative position depend?* This can be easily answered thus: B is so many degrees of longitude to the east or west of A, so many degrees of latitude to the north or south of A, and so many feet above or below the level of A. THREE numbers suffice, according to this mode of viewing the question, to determine the position of B when that of A is given. Looking at it from another point of view, suppose A to be the earth, B a fixed star. To point a telescope at B, we require to know its altitude and azimuth, its latitude and longitude, or its right ascension and declination. Any of these pairs of numbers will give us the *direction* of the line AB, but to determine absolutely the position of B, we require a *third* number—viz., the length of AB. Hence, it appears that any given line AB, of definite length and direction, is completely determined by *three* numbers. Also, if the line *ab* be parallel and equal to AB, it evidently depends on the same three numbers. Hence, if we take the expression (AB) to denote (*not*, as in geometry, the length of AB merely, but) the length and direction of AB; we see that there will be no error introduced, if we use it in the following sense:

$$A + (AB) = B;$$

i.e., if, beginning with A, we take the step represented by (AB), we shall find ourselves at B. From this it follows at once that, if C be any third point,

$$A + (AB) + (BC) = C;$$

i.e., beginning at A, and taking the successive steps (AB) and (BC), we are finally brought to C. But we have also

$$A + (AC) = C,$$

by taking the step from A to C at once. Hence, with the present signification of (AB) &c., we see that

$$(AB) + (BC) = (AC),$$

which shews that lines, *when their length and direction are both considered*, are to be added or compounded according to the same law as velocities or forces. See COMPOSITION OF FORCES. In this sense, a line is called by Sir W. R. Hamilton a *Vector*.

Again, we have evidently

$$A + (AB) + (BC) + (CA) = A,$$

because the three successive steps bring us back to the starting-point. Hence

$$(AB) + (BC) = -(CA),$$

and therefore (AC) = − (CA), or the sign (only) of a vector is changed if its direction be reversed.

The rules for the addition, and therefore for the subtraction, of vectors are thus extremely simple; and, without any further preface, we are in a position to solve a great many geometrical problems, some of which are of no common difficulty. A comparatively simple one must suffice; let us prove Euclid I., 33; i.e., if AB be parallel and equal to CD, AC is parallel and equal to BD. In vectors, given (AB) = (CD), prove (AC) = (BD). We have at once, by going directly from A to C, and then by the course A, B, D, C,

$$(AC) = (AB) + (BD) + (DC).$$

But (AB) = (CD) = − (DC) by what we have just proved. Hence the first and third terms of the expression for (AC) are equal and of opposite signs, and therefore

$$(AC) = (BD).$$

This example has been chosen from its simplicity, and gives an extremely inadequate idea of the grasp which vectors take in common geometry.

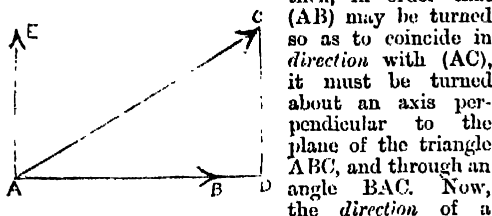
So far, we have not advanced much beyond common geometrical methods; but we *now* come to the step in which quaternions proper are introduced, a vector being merely a degraded species of

quaternion. This new step contains Hamilton's answer to the question, answered over and over again during the last fifty years in forms of the most uncouth complexity, '*How to express the product, or the quotient, of two vectors, or directed lines.*' In other words, keeping to one part of the question only, what is the nature of the factor q in the equation

$$(AC) = q(AB),$$

where A, B, C are any three points?

Let us first consider *on how many independent numbers does it depend?* It might at first sight appear to depend on *six*, for (AB) and (AC), as we have already seen, each contain *three*. But let us analyse the process of passing from the one vector to the other, much as we have already analysed the vector step of passing from one point to another. To simplify the idea of the process, let us suppose it to be effected by a species of rotation. First, then, in order that (AB) may be turned so as to coincide in *direction* with (AC), it must be turned about an axis perpendicular to the plane of the triangle ABC, and through an angle BAC. Now, the *direction* of a line depends on *two* numbers, as we have seen above; hence we have *two* for the direction of the axis, and *one* for the angle through which AB is turned. But AB and AC are not, in general, of equal length; hence, after their directions have by turning been made coincident, AB must be compressed or stretched till its *length* is the same as that of AC. Thus, a *fourth* number is required for the complete description of the process, and therefore q depends upon *four independent numerical quantities;* hence its name, quaternion. A similar investigation, but somewhat less elementary, shews that the *product* of two vectors also depends on four distinct numbers. This will be proved analytically further on in the article.



Now, suppose AB and AC to be *equal* to each other, and at right angles; and suppose

$$q(AB) = (AC);$$

i. e., suppose that q turns AB through a right angle in a given plane, without altering its length. Apply the operation, denoted by q, a second time, and we have

$$q \cdot q \cdot (AB) = q(AC).$$

Now q(AC) must represent a vector equal to AC in length, but turned through a right angle, in the plane BAC. It must therefore be in the direction of BA produced through A, and equal in length to AB. Hence, by a previous remark, it may be expressed by

$$-(AB), \text{ or by } (BA).$$

Hence, $q \cdot q(AB) = -(AB)$, or $q \cdot q = -1$.

The particular quaternion, therefore, which turns a vector through 90° without altering its length, has its square equal to -1. Though, of course, they are essentially a real geometrical conception, this result shews how closely quaternions are connected with what are called Imaginary Quantities (q. v.) in analytical geometry and algebra.

Now, it is found, by a careful examination of all the consequences involved, that we are at liberty to represent by a vector of unit length, perpendicular to the plane of two equal lines at right angles to each other, the quaternion which, employed as a multiplier, changes one of these lines into the other. This result we must assume, as its proof, though not in any sense difficult, would require the free use of analytical symbols to condense it within our assigned limits. Hence, three vectors, each of unit length, and each perpendicular to the other two, have the property that the product of any two, taken in the proper order, is the third. For illustration, suppose these to be drawn eastwards, northwards, and upwards, and let them be represented (according to Hamilton's notation) by i, j, k respectively; we have the following equations among them:

$$i \cdot j = k, \quad j \cdot k = i, \quad k \cdot i = j;$$

where it is to be observed that the *order* of the alphabet is maintained throughout. Also, as before, we see that $i^2 = j^2 = k^2 = -1$.

Considering them, for a moment, as handles to be laid hold of to turn the whole system about one of them, we see that i turns j into the position of k; that is, the operation i may be effected by a left-handed quadrantal rotation about the eastward line i. What, then, is the result, upon the vector i, of the rotation symbolised by j? Laying hold of the northward line j, use it as an axis of left-handed quadrantal rotation, and the effect on the system will be not only (as above, $jk = i$) to make the upward line an eastward one, but to make the eastward line a *downward* one; in symbols,

$$j \cdot i = -k.$$

Comparing this with

$$i \cdot j = k,$$

we see that in quaternions, *the Commutative Law of Multiplication does not hold;* i. e., that the product depends not only on the factors, as in arithmetic and algebra, but upon the *order* in which the multiplication is effected. This is, of course, a little perplexing to the beginner, but is easily got over; and the mere consideration of this fact is often sufficient for the proof of theorems regarded in general as of no ordinary difficulty.

For further information, we must refer the reader to Sir W. R. Hamilton's *Lectures on Quaternions*, or his forthcoming *Elements of Quaternions.* Some elementary information may also be derived from papers by Kelland and Tait in the *Quarterly Messenger of Mathematics*, and the *Quarterly Mathematical Journal.* The subject is yet in its infancy, but even now its power is herculean; and its extreme simplicity and generality recommend it to all who are desirous of extending the effective range of mathematical analysis.

QUA'TRAIN (Fr. *quatre*, four) is the name given (originally by the French) to a little poem of four verses (lines) rhyming alternately, or even sometimes to four verses of a longer poem, such as a sonnet, if they form a complete idea within themselves. Epigrams, epitaphs, proverbs, &c., are often expressed in quatrains.

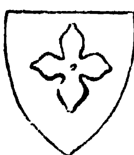
QUATRE-BRAS (Four Arms), a village of Belgium, province of South Brabant, about ten miles south-south-east of Waterloo. It is situated at the intersection of the great roads from Brussels to Charleroi, and from Nivelles to Namur, whence its name. On the 16th of June 1815—two days before the battle of Waterloo, Q. was the scene of a desperate and sanguinary battle between the English under Wellington and the French under Ney. The honours of the field remained with the former; but the severe defeat of Blücher the same day at Ligny, rendered Wellington's hard-won victory almost

valueless; and foreseeing that it would be impossible for him to maintain his position, the English commander retired next morning through Jemappes to Waterloo, in order to keep up his communication with the Prussian army. The loss of the English and their allies at Q. was in all 5200; that of the French, though beaten, amounted only to 4140. This is to be accounted for by the fact that, during the greater part of the engagement, the English had no cavalry (for the Belgian horse galloped off the field without striking a blow) and no artillery.


Quatrefoil.

QUATREFOIL, an opening in tracery, a panel, &c., divided by cusps or featherings into four leaves. This form is much used as an ornament in Gothic architecture.

QUATREFOIL, a heraldic bearing meant to represent a flower with four leaves. It is not represented with a stalk unless blazoned as *slipped*, in which case the stalk joins the lower leaf.


Quatrefoil.

QUATREMÈRE, ETIENNE MARC, a learned French orientalist, was born in Paris 12th July 1782, and from his earliest childhood to his latest years, was literally immersed in abstruse studies, and lived more after the fashion of a medieval recluse than a modern scholar. His public life was almost eventless. Employed in 1807 in the manuscript department of the *Bibliothèque Impériale*, he was promoted in 1809 to the Greek Chair in the College of Rouen, and in 1819 to the chair of Ancient Oriental Languages in the Collége de France. In 1827 he became Professor of Persian in the School for Modern Oriental Languages. He died 18th September 1857. Q.'s erudition was something enormous, as might have been expected from his uninterrupted life-long devotion to study, but according to M. Ernest Renan (himself one of the first living orientalists), he was strikingly deficient in critical insight, and a genius for sagacious and luminous generalisation. He would never believe in the hieroglyphic discoveries of Champollion; he despised comparative philology, and thought the labours of men like F. Schlegel, Bopp, Burnouf, &c. were wasted. But in less delicate fields of exploration he is safe. His historical and geographical memoirs, for example, are of incalculable value. Q.'s principal works are—*Recherches sur la Langue et la Littérature de l'Egypte* (Par. 1808), in which it is shewn, in the clearest manner, that the language of ancient Egypt is to be sought for in the modern Coptic; *Mémoires Géographiques et Historiques sur l'Egypte* (Par. 1810); *Histoire des Sultans Mameloucks* (Par. 1837), from the Arabic of Makrizi; *Histoire des Mongols de la Perse* (Par. 1836), from the Persian of Rashid-Eddin; and his edition of the Arabic text of the Prolegomena of Ibn-Khaldun, one of the most curious monuments of Arabic literature. Besides these, a multitude of most valuable articles are scattered through the pages of the *Journal Asiatique* and the *Journal des Savants*. It is deeply to be regretted that circumstances interfered to prevent his executing certain great lexicographical works—Arabic, Coptic, Syriac, Turkish, Persian, and Armenian dictionaries—which he had planned, and for which he had gathered ample materials. His old master, Silvestre de Sacy, pronounced him 'the only man capable of making an Arabic dictionary.'

QUA'VER, in Music, a note whose measure is equal to half a crotchet, one-fourth of a minim, or one-eighth of a semibreve. It is represented thus: [notes], or when two or more are conjoined, thus: [notes].

QUAY (Fr. *quai*), an artificial landing-place or wharf, consists usually of a platform on piles, or of masonry, surmounted with cranes, tramways, and other appliances for lading and discharging cargoes from shipping.

QUEBE'C, the most important military position in British North America, is situated on a steep promontory at the junction of the rivers St Lawrence and St Charles, in lat. 46° 48′ N., long. 71° 12′ W. It is distant from Liverpool about 2520 miles, is 180 miles north-east of Montreal, 503 miles east-north-east of Toronto, and 556 miles north-north-east of New York. It is connected with all the cities in America by means of the Grand Trunk Railway. The site of Q., originally occupied by an Indian village named Stadacona, was discovered by Jacques Cartier in 1535; but the city was founded by Champlain in 1608. It continued to be the centre of French trade and civilisation, as well as of Roman Catholic missions in North America till 1759, when it fell into the hands of Britain by the memorable victory of Wolfe on the heights of Abraham above the city. Q. remained the chief city of Canada till the British settlements in the West were erected into a separate province, when it became the capital of Canada East; and though Ottawa (q. v.) has been at last chosen as the capital of the United Canadas, the movement begun in June 1864, for a federal union of all the British North American provinces, may lead to Q. being made the metropolis of the confederation. The citadel of Q. is the most impregnable fortress on the continent of America. The view which it commands is one of the most magnificent in the world, and the scenery in its neighbourhood, amid which are the Falls of Montmorenci, imparts an additional attraction to the city. A seminary for the education of Roman Catholic clergymen was established in the city in 1636 by M. de Laval de Montmorenci, and was raised by the queen in 1854 into a university bearing Laval's name. A Presbyterian college, named after its founder, Dr Morrin, was instituted in 1862, and affiliated in the following year to the M'Gill University of Montreal. Q. is the seat of a Roman Catholic archbishop and an Anglican bishop, whose respective cathedrals are among the finest specimens of Canadian church architecture. The Church of Scotland and the principal denominations of dissenters, are also represented in the city. From the building-yards of Q. there are annually launched between 30 and 40 vessels of various tonnage. From 1400 to 1500 vessels enter the port every year from the ocean, principally to export the produce of the country. The chief export trade is in timber, of which there are annually shipped about 33,000,000 cubic feet. The exports in 1861 amounted altogether to £1,663,264 sterling; the imports to £1,286,872; the duties collected to £98,820. The population in the same year was 51,109. The city returns three members to the provincial parliament.

QUE'DLINBURG, a town of Prussian Saxony, at the northern base of the Harz Mountains, on the river Bode, and 35 miles south-west of Magdeburg. Founded by Henry the Fowler in 920, it consists of an old town, a new town, and several suburbs, and is surrounded by a wall flanked with towers. On an eminence overlooking the town stands the castle, which, prior to the Reformation, was the residence of the abbesses of Q., who were

independent princesses of the empire, and had a vote in the diet, and other privileges. This town was a favourite residence of the German emperors of the Saxon line. It is now the centre of considerable industry. Cloth is manufactured, and there is a good trade in corn and cattle. Pop. (1862), exclusive of the garrison, 14,835.

QUEEN (Sax. *cwen*, woman; Gr. *gyne*, woman; Sansc. *goni*, mother, from *gan*, to generate), in its primary signification, the king's consort, who has in all countries been invested with privileges not belonging to other married women. The English queen, unlike other wives, can make a grant to her husband, and receive one from him. She can sue and be sued alone, and purchase land without the king's concurrence. The Statute of Treasons makes it treason to compass her death, or to violate her chastity, even with her consent, and the queen consenting is herself guilty of treason. If accused of treason, the queen is tried by the peers of the realm. A duty, amounting to one-tenth of the value of fines on grants by the crown, was in former times due to the queen, under the name of Queen-gold. Charles I. purchased it from his consort, Henrietta Maria, in 1635, for £10,000, but it was not renewed at the Restoration. The queen-consort is exempt from paying toll, and from amercements in any court. She has a household of her own, consisting of six Ladies of the Bedchamber, a Lord Chamberlain, Vice-chamberlain, Mistress of the Robes, Master of the Horse, and three Equerries, as also her Attorney-general and Solicitor-general, distinct from those of the king, who are entitled to take a place within the bar along with the King's Counsel, and prosecute suits in law and equity for the queen. It has been the usual practice to crown the queen-consort with solemnities similar to those used in the coronation of the king. In the case of Queen Caroline, consort of George IV., who was living apart from her husband, this was not done, though her right to coronation was argued by Mr Brougham before the Privy Council. Certain rents or revenues were anciently appropriated to the income of the queen, but no separate revenues seem ever to have been settled on any queen-consort by parliament. Her personal expenses are defrayed from the king's privy purse.

The *Queen-dowager* is the widow of the deceased king. She retains most of the privileges which she enjoyed as queen consort, nor does she lose her dignity by re-marriage; but it has been held that no one can marry the queen-dowager without permission from the king, on pain of forfeiture of lands and goods. On the marriage of a king, or accession of an unmarried prince, parliament makes provision for the queen's maintenance, in case of her survivance. An income of £100,000 a year, with two residences, was settled on the queen of George III.; and the same provision was made for the late Dowager Queen Adelaide, at the commencement of the reign of William IV. The queen-dowager, when mother of the reigning sovereign, is styled the Queen-mother. Until the time of George II., queens-consort bore the arms of the king impaled with their paternal coat, with the king's dexter and their paternal sinister supporter; since that period, they have used both royal supporters. It is not usual to place the arms of the queen-consort within the Garter.

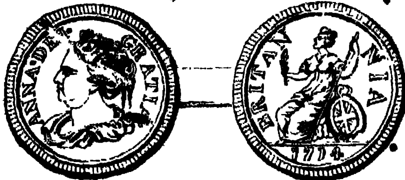
The *Queen-regnant* is a sovereign princess who has succeeded to the kingly power. In modern times, in those countries where the Salic law does not prevail, on failure of males, a female succeeds to the throne. By an act of Queen Mary, the first queen-regnant in England, it was declared 'that the regall power of this realme is in the quenes majestie as fully and absolutely as ever it was in any of her most noble progenitours kinges of this realme;' and it has since been held, that the powers, prerogatives, and dignities of the queen-regnant differ in no respect from those of the king. The husband of the queen-regnant is her subject; but in the matter of conjugal infidelity, he is not subjected to the same penal restrictions as the queen-consort. He is not endowed by the constitution with any political rights or privileges, and his honours and precedence must be derived from the queen. The late Prince Consort was naturalised by 3 and 4 Vict. c. 1, 2, words being used which enabled him to be a privy-councillor, and sit in parliament; and by 3 and 4 Vict. c. 3, Queen Victoria was empowered to grant him an annuity of £30,000; but it was provided that His Royal Highness was not, by virtue of his marriage, to acquire any interest in the property of her Majesty. By a decree of the Queen, Prince Albert enjoyed place, pre-eminence, and precedence next to her Majesty.

A queen-regnant is the only woman who is in her own right entitled to bear her arms in a shield and not in a lozenge. She is also entitled to the exterior ornaments of helmet, mantling, crest, and motto, and may surround her shield with the Garter, and the collars and ribbons of all other orders of knighthood of which she is sovereign.

QUEEN ANNE'S BOUNTY, the name given to a fund appropriated to increase the incomes of the poorer clergy of England, created out of the first-fruits and tenths, which before the Reformation formed part of the papal exactions from the clergy. The first-fruits are the first whole year's profit of all spiritual preferments, and the tenths are one-tenth of their annual profits, both chargeable according to the ancient declared value of the benefice; but the poorer livings are now exempted from the tax. Henry VIII., on abolishing the papal authority, annexed both first-fruits and tenths to the crown; and statute 2 and 3 Anne, c. 11, first formed them into a perpetual fund for the augmentation of poor livings. The Archbishops, Bishops, Deans, Speaker of the House of Commons, Master of the Rolls, Privy Councillors, Lieutenants, and *custodes rotulorum* of the counties, the Judges, Queen's Serjeants-at-law, Attorney and Solicitor-general, Advocate-general, Chancellors and Vice-chancellors of the two Universities, Lord Mayor and Aldermen of London, and mayors of the several cities; and by supplemental charter, the Officers of the Board of Green Cloth, the Queen's Counsel, and the four Clerks of the Privy Council, were made a corporation by the name of 'The Governors of the Bounty of Queen Anne, for the Augmentation of the Maintenance of the Poor Clergy;' and to this corporation was granted the revenue of first-fruits and tenths. The income from first-fruits and tenths together is about £14,000 per annum, and it is appropriated from year to year in capital sums, either to increase, by the accruing interest, the income of the incumbents, to purchase land for their benefit, or to erect residences for them. At present, the mode of appropriating augmentations to livings is by granting £200 to meet each approved benefaction offered by individuals to obtain such grants. The governors have also had the distribution of eleven sums of £100,000 each, voted by parliament from 1809 to 1820, to augment the incomes of the clergy. They present annually an account of their receipts and expenditure to parliament.

QUEEN ANNE'S FARTHINGS. The farthings of Queen Anne have attained a celebrity from the large prices sometimes given for them by collectors.

Their rarity, however, has been much overrated; it was, indeed, long a popular notion that only three farthings were struck in her reign, of which two were in public keeping—a third was still going about, and, if recovered, would bring a prodigious price. The Queen Anne farthings were designed by a German of the name of Crocker or Croker, principal engraver to the Mint; and were only patterns



Queen Anne's Farthing.

of an intended coin, having never been put into circulation; but they are by no means exceedingly scarce. Some of them have raised letters, and on the reverse, the four shields of England, France, Scotland, and Ireland, arranged as a cross, and separated by fleurs-de-lis. Those with sunk letters are less frequently met with—some of which have for obverse Peace on a car, others Britannia under a canopy. A few of them were struck in gold.

QUEEN CHARLOTTE ISLAND AND QUEEN CHARLOTTE SOUND. See VANCOUVER ISLAND.

QUEEN OF THE MEADOW. See SPIRÆA.

QUEEN-POST, the side or secondary upright ties in a trussed-roof. See ROOF.

QUEEN'S BENCH, or KING'S BENCH, one of the three superior courts of common law in England, the other two being the Courts of Common Pleas and Exchequer. The Court of King's Bench was so called from the origin of the court, inasmuch as the king used to sit there in person. In Cromwell's time, it was called the Upper Bench. The court consists of five judges, a chief-justice (who is called the Chief-justice of England, and is the highest of all the judges next to the Lord Chancellor), and four puisne judges called justices. Though the court has long been fixed permanently in Westminster Hall, London, yet it may sit anywhere in England, and may follow the sovereign's person. There is an appeal from most of the decisions of the Q. B. to the Exchequer Chamber, which consists of the judges of the two other common law courts, and from thence to the House of Lords. The ancient jurisdiction of the court, and the history of its modifications, are too technical to be stated in this place, but the outline of the leading points of jurisdiction may be shortly stated. The Q. B. is the highest court which has a criminal jurisdiction, and such jurisdiction is unlimited. But practically, this jurisdiction is seldom exercised originally, for it is only when an indictment is removed from an inferior court into the Q. B. that a criminal trial takes place there, and this is only the case when there is some peculiar difficulty or importance attending the trial, which renders it expedient to remove it from the sessions or assizes. But though criminal trials in the Q. B. are exceptional, there are certain criminal matters which are part of its ordinary administration. A criminal information, for example, when filed by the Attorney-general, or the master of the Crown-office, charging a person with a criminal offence, is tried in the Q. B. as a matter of course, and can be tried in no other court. The Q. B. exercises a superintending control over all inferior tribunals, and also over public bodies, by commanding them to do a specific duty, the writ being called a writ of Mandamus; or by prohibiting them from going on with some matter over which they have no jurisdiction, by a writ called a writ of Prohibition. The Q. B. also entertains appeals from justices of the peace on a vast variety of matters. Besides the criminal jurisdiction, and the prerogative writs of Mandamus, Prohibition, and Quo Warranto, there is a civil jurisdiction belonging to the Q. B. of the most extensive kind; indeed, any civil action to recover debts and damages may be brought there. The civil jurisdiction is, however, shared in common with the other two common law courts. The judges of the Q. B. are often called the Queen's Coroners, having a universal jurisdiction of that kind throughout England, though seldom acting in that capacity. The Chief-justice has latterly been usually made a peer, or has the option of becoming one if he pleases. The officers of the court are the Master of the Crown-office, who attends to the criminal department of the business, and several masters of the court, who attend to the civil department. The puisne judges of the Court of Q. B. rank before those of the other two courts.

QUEEN'S COLLEGE, Oxford. In 1340, Robert de Eglesfield, chaplain or confessor to Queen Philippa, founded, by licence from Edward III., a collegiate hall in Oxford, under the name of the Hall of the Queen's Scholars. In his statutes, he sets forth his motives and objects with unusual minuteness. Theological study was the main object of the foundation. Residence was rigidly enforced, and poverty enjoined with peculiar force. The original number of the provost and fellows was to be 13, in memory of our Lord and the 12 apostles; and the ultimate number of poor boys to be educated on the foundation was 72, in memory of the 70 disciples. Few colleges, however, have disregarded more directly the wishes of their founders. When the Commissioners under 17 and 18 Vict. c. 81, began their work, they found the poverty required changed into a provostship of £1000 a year, and fellowships of £300, the conditional preference to north-countrymen converted into an absolute exclusion of all others; and the 72 poor children represented by 8 'taberdars,' as they are called, who were alone eligible to fellowships. A separate foundation had been given to Queen's by John Michel, Esq., in 1736, consisting of 8 open fellowships, and 4 open scholarships. The Commissioners introduced great changes. The foundations are consolidated, and the college now consists of a provost, 19 fellows, 15 scholars or taberdars, and 2 Bible-clerks. There are also upwards of 20 exhibitions in this college, ranging from £30 to £100 per annum, confined for the most part to natives of the northern counties. There are 28 benefices in the gift of this college, and also the principalship of St Edmund Hall.

QUEEN'S COUNSEL are certain barristers who receive from her Majesty a patent giving them preaudience over their brethren, and but for which they would rank only according to seniority of their standing as barristers. The advantage of appointing Queen's Counsel is this, that it enables the most able or successful counsel to take precedence of those of the same or longer standing, and to take the chief conduct of causes. In practice, there are almost invariably two counsel engaged on each side, called a leader and a junior, and the leader is generally a Queen's Counsel, and the junior is not. The appointment is made by the crown, on the nomination of the Lord Chancellor. The practice of appointing crown counsel is adopted in Ireland, but not in

Scotland. In the Courts of Chancery in England, it is usual for a Queen's Counsel to confine himself to a particular Vice-Chancellor's court, or to that of the Master of the Rolls, so that his clients may always reckon on his attendance there; and when he goes into another court, he requires an addition to his fee. In the common law courts, however, this arrangement is impracticable, and has never been adopted. It is sometimes popularly believed that the appointment of Queen's Counsel entitles the counsel to a salary from the crown; but this is a mistake, except as to the Attorney and Solicitor-general. When a Queen's Counsel is engaged in a criminal case against the crown, as, for example, to defend a prisoner, he requires to get special licence to do so from the crown, which is always given, as a matter of course, on payment of a small fee. In courts of law and equity, a Queen's Counsel is entitled to preaudience over all other counsel, except those who were appointed Queen's Counsel before him. A Queen's Counsel has preaudience over all Serjeants-at-law, though many of the latter obtain patents of precedence, which also make them in effect Queen's Counsel, as well as serjeants, and prevent them being displaced by those who come after them. The order of Serjeants-at-law is much more ancient than that of Queen's Counsel, though now it is in point of rank inferior. The practice of appointing Queen's Counsel is not older than the time of Sir Francis Bacon, who was the first appointed.

QUEEN'S COUNTY, an inland county of the province of Leinster, Ireland, is bounded N. by the King's County, E. by Kildare and Carlow, S. by Kilkenny, and W. by Tipperary and King's County. Area, 424,854 acres, of which 342,422 are arable. Pop. in 1861, 90,750, of whom 79,959 were Catholics, 9854 Protestants of the Established Church, and the rest Protestants of other denominations. The number of acres under crop in 1863 was 143,618; cattle, 57,580; sheep, 90,311; pigs, 24,069. Q. C., for the most part, is within the basin of the Barrow, which is the principal river, and is partly navigable for barges. On the north-western border lie the Slieve Bloom Mountains, and the Dysart Hills occupy the south-east; the rest of the surface being flat or gently undulating. In its geological structure, it belongs to the great limestone district; but the Slieve Bloom Mountains are sandstone, and the Dysart Hills include coal, but not in deep or profitably-worked beds. Coarse linen and cotton cloths are manufactured in small quantities. The chief town is Maryborough; pop. (1861) 2857. Q. C. anciently formed part of the districts of Leix and Ossory; and after the English invasion, on the submission of the chief O'More, the territory retained a qualified independence. Under Edward II., the O'Mores became so powerful, that for a long series of years, an unceasing contest was maintained by them with the English, with various alternations of success. In the reign of Edward VI., Bellingham, the Lord-deputy, succeeded in re-annexing the territory of the O'Mores to the Pale (q. v.); and a new revolt in Mary's reign led to strong and successful measures, by which it was finally reduced to a shire, under the name Q. C., given to it in honour of Mary, from whom also the chief town Maryborough, was called. There are a few antiquities of interest—a perfect round tower, and two in a less perfect condition, and some ecclesiastical and feudal remains, the most important of the latter being a castle of Strongbow on the picturesque Rock of Dunamare. Q. C. is traversed by the Great Southern and Western Railway, and also by a branch of the Grand Canal. It returns two members to parliament.

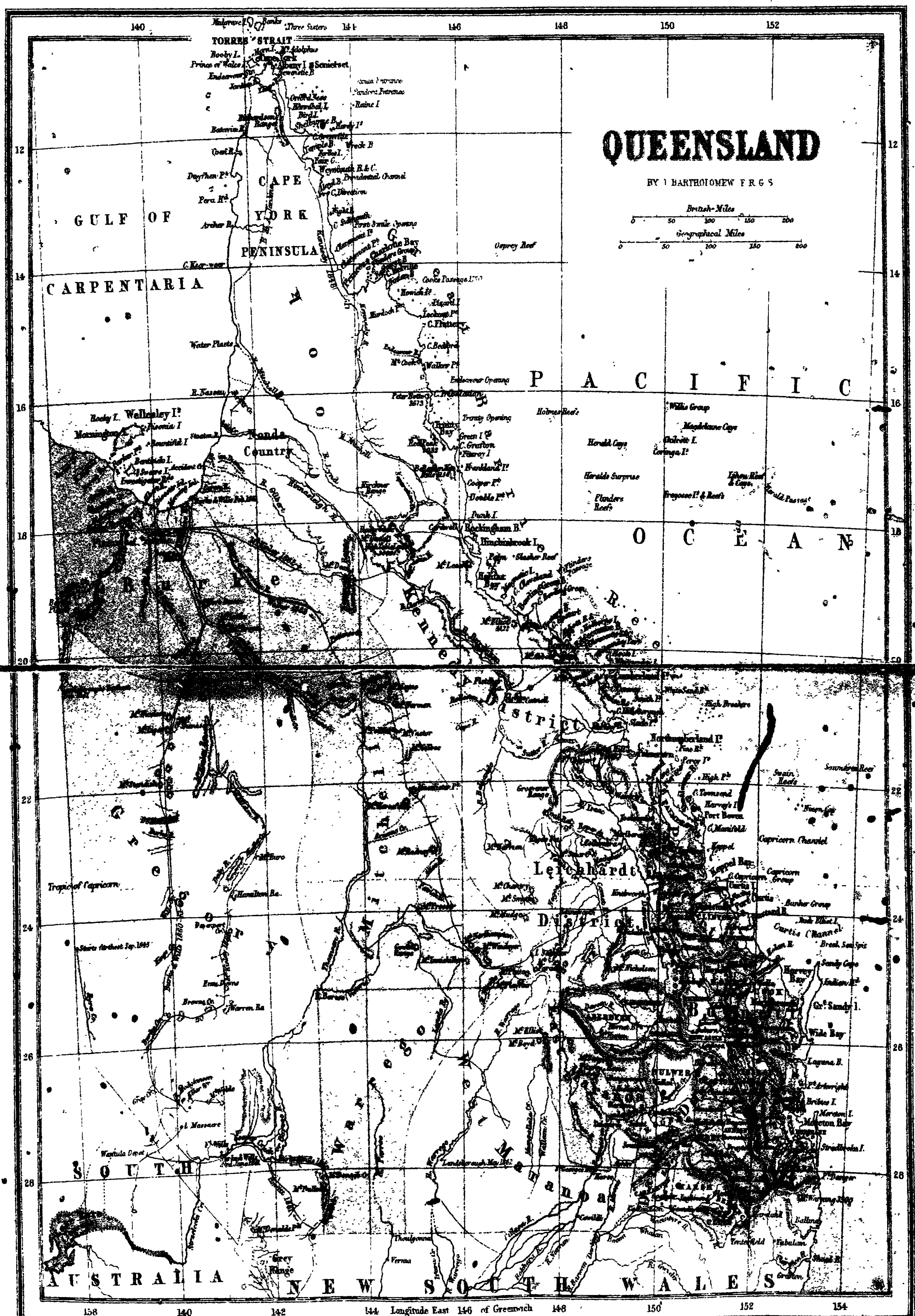
QUEEN'S EVIDENCE. See KING'S EVIDENCE.

QUEE'NSFERRY, SOUTH AND NORTH.—South Q. is a royal and parliamentary burgh in Linlithgowshire, on the south shore of the Firth of Forth, about 9 miles west-north-west of Edinburgh. It was erected into a royal burgh in 1636, but was for centuries before a burgh of regality. The walks and scenery about South Q., with Hopetoun House and grounds on the west, and Dalmeny Park on the east, are very beautiful, and the town itself is a good deal resorted to for sea-bathing. The Forth—much wider both above and below the ferry—here narrows to a width of only about two miles. It receives historical mention as early as the middle of the 11th c., as the ferry across which royal personages passed when travelling between Edinburgh and Dunfermline. A railway-bridge across the firth at this point has long been talked of. Pop. (1861) 1230, within the parliamentary bounds. South Q. is one of the Stirling district burghs.—*North Queensferry*, a small village in Fifeshire, on the north shore of the Firth of Forth, opposite South Q.; pop. about 400.

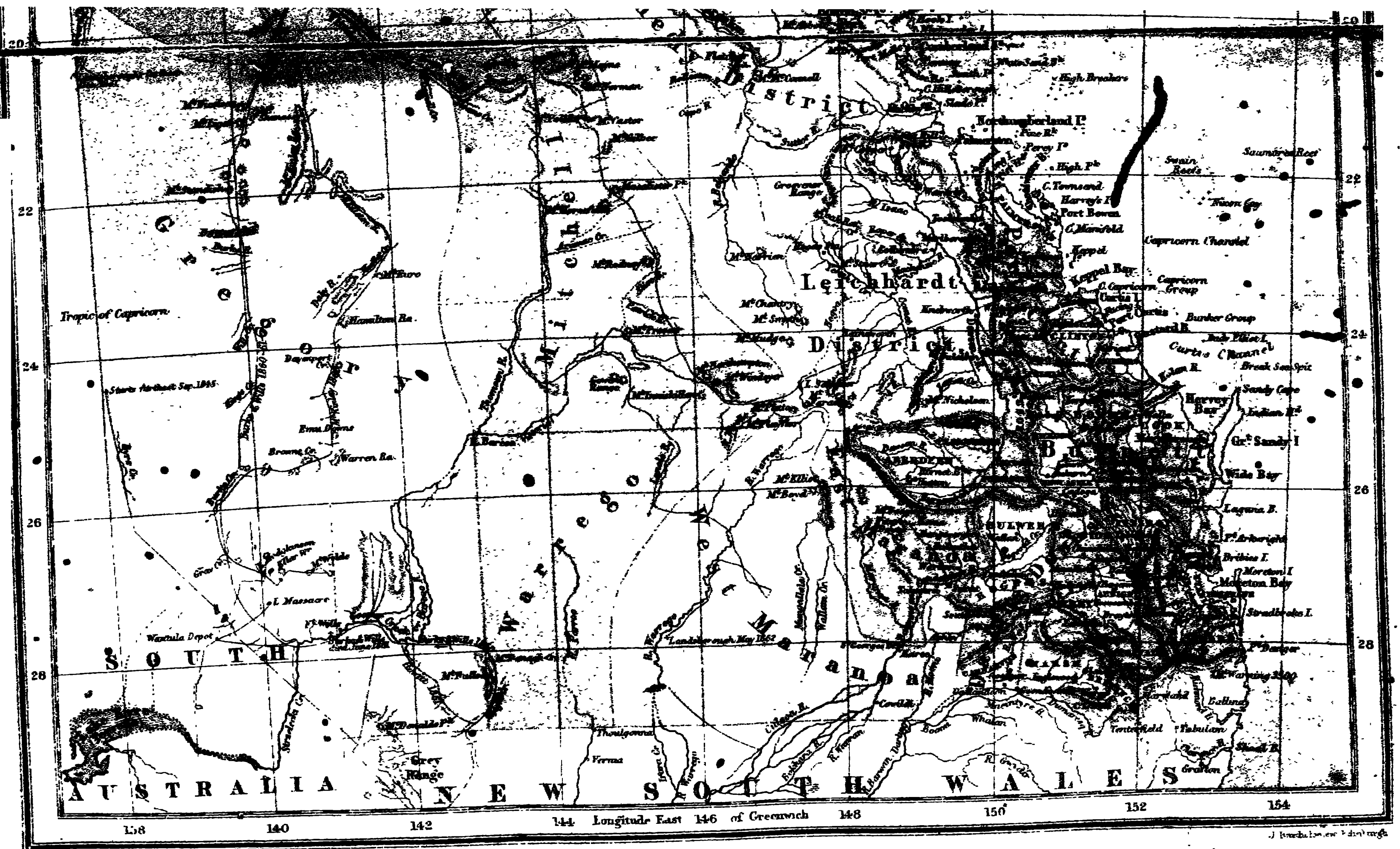
QUEE'NSLAND. This new British colony occupies the whole of the north-eastern portion of Australia, commencing at a point of the east coast about 400 miles north of Sydney, called Point Danger, in lat. 28° 8′ S. The greater portion of the southern boundary-line is formed by the 29th parallel of south latitude. The eastern seaboard extends about 1300 miles to Cape York, the extreme northern point of the continent, in lat. 10° 40′. The mean breadth of the territory is 900 miles, from the eastern coast-line to the meridian of 138° E. long., which forms the western boundary-line. This includes the greater portion of the Gulf of Carpentaria, which has a seaboard of about 900 miles. The whole of Q. comprises 678,000 sq. m.—nearly twelve times the area of England and Wales.

The portion of the colony extending along the eastern coast, is indented with numerous bays, which are the outlets of many navigable rivers, having their sources in the cool gorges and deep recesses of a great mountain-range, running north and south, parallel with the sea-coast, at a distance of from 50 to 100 miles. The summits of this great 'dividing range,' rise from 2000 to 6000 feet above the level of the sea. Numerous spurs are given off from the range in ridges sloping gradually towards the coast. These ridges are generally composed principally of quartz, and in many places form good natural roads for a considerable distance. The ridges are usually covered with a variety of fine and valuable timber. The iron-bark, blood-wood, box, and other descriptions of wood, very valuable to the farmer for fencing and building, are found here in great abundance.

Unlike almost every other portion of Australia, Q. is correctly described as 'a land of rivers and streams.' These rivers find an outlet in the many large and beautiful bays and estuaries on the eastern seaboard. One of these, Moreton Bay (q. v.), receives the waters of five rivers, which are always navigable. The largest of these, the Brisbane, is navigated by good-sized steamers for 75 miles, and is nearly a quarter of a mile wide at a distance of 15 miles from its mouth. The principal rivers on the eastern seaboard are the Logan, the Brisbane, the Mary, the Caliope, the Boyne, the Fitzroy, the Pioneer, and the Burdekin. The longest tidal river in Q. is the Fitzroy, which drains an area of not less than 50 millions of acres, and is navigable as far as Yaruba, 60 miles from its estuary in Keppel Bay. It receives, as its principal tributaries, the Dawson, Mackenzie, and Isaacs, large streams flowing for



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several hundred miles from the north-west, west, and south-western parts of the interior. The tide at Rockhampton (40 miles from the embouchure of the river) rises 14 feet, and the stream is thus rendered navigable for vessels of considerable burden.

The banks of the rivers are usually well elevated, and in many places consist of very rich alluvium, brought down from the great mountain-ranges. This alluvial soil is frequently of very great depth, and is marked everywhere by a magnificent growth of timber, very unlike the ordinary Australian wood. The enormous fig-trees and gigantic eucalyptæ tower aloft, and spread out their great arms, festooned with vines and flowering parasites, which throw themselves over every spreading branch, and deck it with their varied and brilliant colours; the tall pine-trees shoot up their straight stems to a great height; while the cedar, the myrtle, the rosewood, and tamarind trees, display their rich and green foliage in every variety of shade. A thick evergreen hedge of mangroves covers the banks, preserving them from the wash of the stream; and at certain seasons of the year, this is fringed with thousands of flowering lilies.

Ordinarily, the eastern sea-board part of the country assumes very much the appearance of park-scenery in Great Britain, the trees standing at some distance apart, and the ground between them being covered with grass, which is generally green and luxuriant throughout the whole year. The regularity of the showers which fall in the summer season keeps the grass growing with luxuriant verdure generally during the hot months. Exceptions to this sometimes occur, and a dry summer appears to have been experienced in this part of Australia about once in every six or seven years. The summer of 1863 formed one of these exceptional seasons. The frosts of winter being generally so slight as not to injure the vegetation, the country is almost always green from January to December.

Beyond the 'Andes,' or great dividing-range, the country presents features of still greater beauty and fertility. Vast plains—10, 15, or 20 miles across—stretch out their level surface unbroken by a single tree, but covered with luxuriant grass, and often purpled over with fragrant herbage. These great plains are composed of rich black soil. They are well watered with a network of streams, which trickle down from the gradual slopes of the mountain-range. The soil in this locality is admirably adapted for tillage; and within a certain distance of the mountain-range, the rains fall with great regularity. The land here is lightly timbered, and is cleared with less labour than on the lower lands, and the soil is proved to be peculiarly adapted for the growth of wheat of the finest quality. The yield per acre in this locality has sometimes been as much as 50, and even 60 bushels to the acre, of 63 lbs. to the bushel. The average yield may be estimated at 30 bushels per acre. Indian corn and other cereals, as well as all the European fruits, grow luxuriantly, and come to the greatest perfection in this highly-favoured locality, which has been called the 'Garden of Queensland.'

This country, west of the great dividing-range, stretches away in a series of fine plateaux for a distance of 400 or 500 miles westward, and, with the interruptions of other mountain-ranges crossing the main range at right angles, for upwards of 1000 miles towards the fertile plains bordering the shores of the Gulf of Carpentaria.

A third distinct portion of Q. is formed by the country which falls off in a succession of steep declivities, or more gradually descending terraces, from the table-land thus described, towards the lower land, which then intervenes between these terraces and the western boundary-line of the colony, in Central Australia. This portion of the territory has been rendered specially interesting from the recent discoveries, which have shewn that instead of a vast and sterile desert of burning sands, the interior of Australia is, with exceptional patches of very limited extent, well grassed and watered, and suitable for pastoral, and in many places even for agricultural occupation.

The climate of Q. is said closely to resemble that of Madeira (q. v.); the mean annual external shade-temperature taken at Brisbane being very nearly the same as at Funchal in Madeira, though it is a little hotter in the summer, and colder in the winter at Brisbane than at Funchal. Moreton Bay, now Q., has for many years been the resort of invalids from all the other British colonies in the southern hemisphere, and has been called the Montpellier of Australia. The summer season is hot—the thermometer rising sometimes to 90° or even 100° in the shade; but the air is dry, elastic, and healthy, and the sea-breezes temper the heat, and make it perfectly endurable, even to the out-door labourer, in the hottest time of the year. However hot the day, the night is almost invariably cool, even in the most northern parts of the colony.

The capital of Q., and the seat of the local government, is Brisbane (q. v.), pop. 13,000. Its situation is described as exceedingly beautiful. Ipswich, Rockhampton, Maryborough, Toowoomber, Gayndah, Dalby, and Bowen, are rapidly rising towns. Rockhampton has already attained great importance, and promises ere long to be the metropolis of Queensland. Although only recently established, its population already exceeds 5000 souls, and is rapidly increasing. Situated upon the largest navigable river of Q., it forms the commercial centre and principal outlet of immense tracts of the interior country. A railway is in process of construction from Rockhampton to Westwood in the direction of Peak Downs, where extensive copper mines, said to vie in richness with those of Barra Barra, have been opened up, and valuable gold deposits are also being worked.

The Alienation of Crown-lands Act, passed during the first session of the colonial parliament, revolutionised the old plan of selling land at a high upset price at auction, and established a system in its stead which is thus described in an official document issued from the Queensland Government Emigration Office in London: 'The Queensland Land Act enables small capitalists to choose their farms themselves on any of the Agricultural Reserves throughout the colony; and these reserves are situated within about five miles of all the larger towns, where there is a market for farm-produce. Each reserve contains at least 10,000 acres, already surveyed, and marked out in farms of from 18 to 320 acres. The price at which the land on the reserves is sold is a fixed price of £1 per acre; but this amount being paid for, say 40 acres, the purchaser is entitled to lease from the government three times as much—that is, 120 acres more, adjoining the piece he has bought, at a rent of 6*d.* per acre a year, for five years; and at the end of this time, he may secure the fee-simple of this leased portion by paying the government £1 an acre for it, after having had the use of the land at this mere nominal charge. The farmer cannot purchase less than 18 acres on the reserves, and must pay £18 for it; but his land-orders are received by the government at their full nominal value of £30 towards the payment

for the portion which he has purchased. Each adult passenger in the family is entitled to land-orders of the value of £30'—which land-orders are exactly the same as 30 sovereigns in purchasing land from the government. The quantity of land taken up on the agricultural reserves by purchase and lease on the terms above described during the year 1862, was 17,134 acres.

The operation of the land and emigration scheme thus established appears to have been most successful. An officer, under the title of Agent-general, appointed for the purpose by the local government, has been engaged in Great Britain in making known and controlling this movement; and as many as nearly 20,000 persons have emigrated to Q. under his direction during the first three years and a half.

The system of free grants of land to persons paying their own full passages, has had the intended effect of attracting a large number of small and larger capitalists; while a system of assisted and free passages, established by a wise adoption of the same land-order system, has freely supplied a class of industrious mechanics, farm-labourers, and general servants. Notwithstanding this, the demand for labour of all kinds is still on the increase.

The agricultural capabilities of Q. are not confined to the elevated table-lands before alluded to as 'the Garden of the Colony.' On the lower lands, on the rivers and bays, and on the fertile valleys and sunny slopes of the eastern side of the range, there are many millions of acres of land immediately available for settlement, and admirably suited for tillage. In this portion of the colony, settlement is advancing by a class of small proprietary farmers. The land is described as very productive, yielding two crops in the year, and capable of producing almost everything that can be grown in any part of the world. Oranges, pine-apples, figs, bananas, grapes, mulberries, peaches, nectarines, granadillas, alligator pears, guavas, flourish in great perfection and abundance, and are seen growing up side by side with wheat, maize, potatoes, and all the fruits, flowers, and vegetables of Northern Europe.

The cultivation of cotton appears likely to be carried on to a large extent. The cotton-plant is said to be indigenous in this part of Australia, and in consequence of the absence of severe frosts, it is also perennial. In the Reports drawn up by the most competent judges, on the samples of cotton from all parts of the world, at the International Exhibition, we find it stated: 'The samples of Sea Islands' cotton from the Australian colonies are far superior to cotton from any other part of the world.' The New Orleans' variety from Q. is also spoken of in the Report as 'particularly good.' Seven medals were awarded to Q. growers, and the distinction of honourable mention was conferred on five more. The average yield per acre was estimated at 400 lbs. of Sea Islands, and from 600 lbs. to 700 lbs. of Orleans; being two-thirds in excess of the average yield of the two sorts taken together in America, which is 300 lbs. per acre. The last two years have proved unfavourable for the new enterprise by the occurrence of two wet winters—the cotton-picking season in Q.; this has been quite exceptional, the weather at this season of the year being ordinarily beautiful, fine, and dry. In spite of this unfavourable circumstance, however, several farmers have done well with the cotton, and in one or two cases realised from 256 to 350 lbs. of clean cotton to the acre. It seems likely the average yield of Sea Islands will be about 300 lbs. per acre. With these advantages, and with the rapid emigration to the colony, there seems every reason to believe they will be able in Q. to compete successfully with slave-grown cotton in America, and produce cotton in large quantities, grown by European labour, at a good paying profit, to sell in Liverpool at ordinary prices. Several cotton-growing companies and a considerable number of private individuals are now engaged in cotton-growing in Q., and notwithstanding the last two unfavourable wet seasons, most of them expect to be eventually successful.

Q. is a great pastoral country; the quantity of live-stock now pastured within the colony, as shewn by the last copy of the *Queensland Statistical Register*, being as follows: horses, 45,850; cattle, 880,392; sheep, 5,672,400; pigs, 7351. It was an idea generally received until within the last few years, that the quality of Australian wool would degenerate as the sheep were driven towards the north. The reverse of this, however, proves to be the case. The Q. wool is remarkable for the fineness of its quality; and this seems to be increasingly the case as the pastoral occupation of the country extends northwards towards the Plains of Promise on the Gulf of Carpentaria. The wool diminishes a little in quantity, the fleeces being lighter, but the increased fineness of the wool more than makes up for a little diminution in its quantity. The value of the exports of wool from Q. in 1863 was £776,776. This is nearly double the quantity exported in 1860. From this may be inferred the rapid occupation of the country for pastoral purposes. This has extended during the last three or four years for hundreds of miles towards the western boundary, and for a still greater distance towards the shores of Carpentaria. Sheep and cattle are now pastured on the Flinders River within about 50 or 60 miles of the gulf, and stock is now being driven along the eastern shores of the gulf towards Cape York, where a Q. settlement has recently been formed at Somerset, at the extreme northern point of the island continent of Australia.

Q. was erected into a separate and independent colony in December 1859. The first representative of the Queen is Sir George Ferguson Bowen. His advisers consist of four cabinet ministers, and a few of the highest officials. There are two Houses of Parliament—the Legislative Council, nominated at present by the governor; and the Legislative Assembly, elected by the people. The suffrage is not universal, but within the reach of every industrious man after a twelvemonths' residence. Voting is by ballot. State aid to religion was abolished by one of the first acts of the parliament.

An excellent system of primary education is in successful and vigorous operation throughout the colony. Grammar-schools are also liberally endowed by the government. The statistics of criminal courts prove that there is less crime in Q. than in Great Britain. The population in the beginning of 1865 is ascertained to be a little over 60,000, of which nearly 16,000 had been added during the last year.

QUEEN'S METAL, an alloy formed by fusing 100 parts of tin with 8 parts of antimony, 4 parts of copper, and 1 part of bismuth. It is a kind of Britannia metal, and is used for tea-pots and similar articles of domestic utility.

QUEEN'S REGULATIONS, or **KING'S REGULATIONS**, are those collections of orders and regulations in force in the army and navy respectively, which serve to guide commanding and other officers in all matters of discipline and personal conduct. The queen's regulations for the navy also in a great degree regulate matters of finance; whereas, in the army, financial matters are left to the War-office Regulations (q. v.). The reason for this distinction is, that as regards the navy, the

Admiralty are responsible both for discipline and finance; while in respect to the army, the commander-in-chief controls the discipline under the direct orders of the sovereign, and the Secretary of State for War directs the finance, for which he is responsible to parliament. The regulations for the army were first collected in 1788, since which several editions have been issued, the last being in 1859. The latest Admiralty regulations bear date 1844. The current regulations are supplemented, corrected, and cancelled by numerous circulars and addenda, so that they never represent the whole body of military or naval rules for many days together.

QUEE'NSTOWN, called formerly COVE OF CORK, Ireland, a seaport town, on the south side of Great Island, in the harbour of Cork, is distant from Cork 14 miles east-south-east, and from Dublin 157 miles south-west-by-west. It rose into some importance during the French war, as the port of embarkation for troops going on foreign service, and is now an admiral's station. On the occasion of the Queen's visit in 1850, the name Q. was given to it in honour of her Majesty. The formation of the town is rather peculiar, as it occupies the sides of an amphitheatre, around which it is built in parallel streets. It enjoys a high reputation for its mild and salubrious climate, and is much frequented by invalids during the winter season. The population in 1861 was 8653, of whom 7240 were Catholics, 1262 Protestants of the Established Church, and the rest of other denominations.

QUEEN'S YELLOW. See YELLOW COLOURS.

QUENTIN, ST, a thriving manufacturing town in the north of France, department of Aisne, is situated on the Somme, about 80 miles north-east of Paris. It is a station on the railway from Paris to Liége. Q. has a celebrated church—'one of the finest, boldest, and purest Gothic buildings in this part of 'Belgic Gaul.' Q. is the centre of the manufacture of linen, muslin, lace, and gauze. Pop. 28,880. The *Canal of St Quentin*, connecting the basin of the Somme with that of the Scheldt, was finished by Napoleon in 1810. It is carried through the intervening hills by tunnels. At St Q., a battle was fought, $\frac{\text{July 28,}}{\text{August 10,}}$ 1557, between the Spaniards, assisted by a body of English troops, and the French, in which the latter were severely defeated.

QUE'RCITRON, the name both of a dyestuff and of the species of oak of which it is the bark. This oak (*Quercus tinctoria*), also called *Dyer's Oak* and *Black Oak*, is a native of North America—one of the noblest forest trees of the United States, found in New England, and as far south as Georgia, although there only at a considerable elevation. The name Black Oak is given to it from the dark colour of its outer bark. The leaves are obovate-oblong, dilated outwards, and widely sinuated; with short, obtuse, and bristle-pointed lobes. The wood is reddish, coarse-grained, and porous, but much esteemed for strength and durability, and is used in America for shipbuilding. The bark is used for tanning as well as for dyeing. It is the inner bark which is the quercitron of dyers. It yields a yellow crystallisable substance, *Quercitrin* ($C_{36}H_{18}O_{20}$ + 2Aq), which may be extracted by means of alcohol; the tannic acid, which is simultaneously taken up, must be precipitated by the addition of gelatine, after which the liquid will, on evaporation, yield crystals of quercitrin. On the addition of alum, its solution assumes a beautiful yellow colour; and solutions of acetate of lead, acetate of copper, and chloride of tin precipitate it in yellow flakes. When boiled with dilute acids, it breaks up into glycose and *quercetin* ($C_{24}H_8O_{10}$)—a yellow crystalline substance, which is soluble in alkaline solutions, to which it communicates a golden-yellow colour. The decomposition shews that quercitrin belongs to the glycosides, or compounds which, when broken up, yield sugar.



Branchlet and Acorn of the Quercitron (*Quercus tinctoria*).

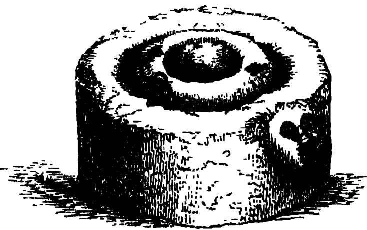
QUERETA'RO, an important town of Mexico, capital of a state of the same name, is charmingly situated on a hilly plateau, 6365 feet above sea-level, 110 miles north-west of Mexico. It is built on a regular plan, contains 11 convents, 3 great squares, many richly-decorated churches, &c. Water is supplied from an aqueduct two miles long, and supported in part upon arches 90 feet high. The industry of the town is important, and is carried on with spirit. Woollen and cotton goods and leather are the chief manufactures. Q. contains the largest cotton-spinning mill in the country; 300 hands are employed in it. The peace between Mexico and the United States was ratified here in 1848. Pop. 47,570.

QUERN, a primitive mill for grinding corn, the stone of which was turned by the hand before the invention of windmills or watermills. It is a contrivance of great antiquity, and so well adapted for the wants of a primitive people, that we find it perpetuated to the present day in remote districts of Ireland, and some parts of the Western Islands of Scotland. The remains of querns have been dug up in Britain, Ireland, and Continental Europe, wherever the traces of ancient population are to be found. They occur in the Scottish Weems (q. v.), or cyclopean underground dwellings; in the Crannoges (q. v.), or lake-dwellings of Ireland and Scotland; and the very similar *Pfahlbauten* of Switzerland; and abundantly among the remains of the Roman period in Britain and Northern Europe. The most usual form of quern consists of two circular flat stones, the upper one pierced in the centre with a narrow funnel, and revolving on a wooden or metal pin inserted in the lower. The upper stone is occasionally ornamented with various devices; in the Roman period, it is sometimes funnel-shaped, with grooves radiating from the centre. In using the quern, the grain was dropped with one hand into the central opening, while, with the other, the upper stone was revolved by means of a stick, inserted in a small opening near the edge. As early as 1284, an effort was made by the Scottish legislature to supersede the quern

by the water-mill, the use of the former being prohibited except in case of storm, or where there was a lack of mills of the new species. Whoever used the quern was to 'gif the threttein measure as multer;' the contravener was to 'tine [lose] his hand-mylnes perpetuallie.' This enactment did not, however, prevent hand-mills from being largely used in Scotland down to the beginning of the present century.

Probably the oldest type of quern is that which was fashioned from a section of oak; one of this description was found in Scotland in 1831, in the course of removing Blair Drummond Moss. It is 19 inches in height by 14 in diameter, and the centre is hollowed to a depth of about a foot, so as to form a mortar, in which the grain seems to have been pounded by a wooden or stone pestle.

A less simple variety of the stone quern, known as the Pot Quern, and also of great antiquity, consists of a circular stone basin, with a hole through which the meal or flour escapes, and a smaller circular stone fitting into it, perforated with an opening through which the grain was thrown into the mill. A number of querns of this description have been exhumed in Scotland, and still more in the bogs of Ireland, in which country the pot quern is believed not to be yet altogether disused. The subjoined wood-cut represents one in the Museum of



Quern.

the Scottish Antiquaries; it is of unusually large size, 17 inches in diameter, and 8¼ high, and was discovered in the parish of Gladsmuir, in East Lothian. It is made of coarse pudding-stone, and is furnished with holes in the sides, to which handles were probably attached. The iron ring is a modern addition.—See Dr Wilson's *Archæology* and *Prehistoric Annals of Scotland*, vol. i. p. 211, *et seq.*, 2d edition (London and Cambridge, 1863).

QUESNAY, François, an eminent French economist and physician, was born at Mérey, near Montfort-l'Amaury, June 4, 1694, and studied at Paris, where, in 1718, he passed surgeon with a high reputation. He acquired a high reputation in his profession, and at his death, in 1774, was first physician to the king. But Q.'s fame depends almost wholly on his economistic speculations, which are to be found scattered through the pages of the famous *Encyclopédie* (see, for example, the articles 'Fermiers' and 'Grain'), the *Journal d'Agriculture*, and the *Ephémérides du Citoyen*. He is the inventor of the term 'Political Economy,' and one of the earliest and most distinguished writers on the subject. His views were systematically set forth in a little treatise, entitled *Tableau Economique*, which was nicknamed by La Harpe, the *Alcoran des Economistes*. Only a few copies of this work were printed about the end of the year 1758, and these have now all disappeared. Nevertheless, the principles maintained by Q. are well known, partly from the sources above mentioned, but chiefly from other treatises that have met with a better fate than the *Tableau*, viz., his *Maximes Générales du Gouvernement Economique d'un Royaume Agricole*, the notes to which occupy more space than the text; *Le Droit Naturel*; *Analyse du Tableau Economique*; *Problèmes Economiques*; and *Dialogues sur le Commerce et sur les Travaux des Artisans*, all of which are to be found in Dupont's *Recueil* of Q.'s writings (Leyden and Paris, 1768).

QUESNEL, Pasquier, a French theologian, was born at Paris, July 14, 1634, and having been educated in the Sorbonne, entered the Congregation of the Oratory in 1657. He obtained [illegible] in his career the reputation of a profound familiarity with Scripture and the Fathers; and by several popular ascetical treatises which he published, he attracted so much notice, that, at the early age of 28, he was appointed director of the Paris house of his Congregation. It was for the use of the young men under his charge that he commenced the series of his afterwards celebrated *Reflexions Morales*. The first specimen of this work having been much admired, Q. continued to extend it to other portions of the New Testament. Soon afterwards, he published an edition of the works of St Leo (2 vols. 4to, Paris, 1675), which has been much criticised. His residence at Paris, however, was cut short by the disputes about Jansenism. Having refused to sign certain propositions, subscription to which was, by a decree of 1684, required of all members of the Oratory, Q. left the Congregation, and retired to the Low Countries, where he attached himself to the party of Arnauld, in which he speedily rose to the first position of influence and authority. He continued at Brussels his *Réflexions Morales*; and in 1693—1694, the Reflections on the New Testament were published in a complete form, with the approval of the Cardinal de Noailles, Bishop of Châlons, and ultimately Archbishop of Paris. The work, however, on examination, was found to contain all the most obnoxious doctrines of Jansenius; and Q., having been denounced to the authorities, was arrested, by order of Philip V., and put into prison. He escaped, and betook himself to concealment. But his book was condemned, first by the decree of an assembly of the bishops of France, and afterwards by a decision of Clement XI. in 1711, and finally by the celebrated bull *Unigenitus*, September 8, 1713. With this condemnation, the formal dogmatic declarations of the Roman Church on this controversy may be said to have ceased. The controversy continued, but nothing, or very little, that was new was afterwards elicited. Q. withdrew to Amsterdam, where he lived to a great age, not having died till 1719, in his 85th year. Besides the *Reflexions Morales*, he left a vast number of treatises, chiefly ascetical. The few dogmatical essays which he published, as well as his critical edition of St Leo, are all tinged with his peculiar opinions. The *Reflexions Morales* falling in, in the main, with the views of one of the religious parties in the Protestant Church, has been translated into German and English, and at one time enjoyed considerable popularity both in England and in Germany.

QUETELET, Lambert Adolphe Jacques, a celebrated Belgian statistician and astronomer, was born at Ghent, 22d February 1796, and studied at the lyceum of his native city, where, in 1814, he became Professor of Mathematics. In 1819, he was appointed to the same chair at the Brussels Athenæum; and in 1826, was chosen by King William I. to superintend the construction of the Royal Observatory in the capital, of which he became director in 1828. In 1836, he was made Professor of Astronomy and Geodesy at the Brussels Military School.

Elected a member of the Belgian Royal Academy in 1820, he became perpetual secretary in 1834. Q. is besides a corresponding member of the Institut de France and of the Royal Society of London. Among his numerous and valuable writings are—*Astronomie Elémentaire* (Par. 1826; 4th ed. Brux. 1848), *Recherches sur la Population, les Prisons, les Dépôts de Mendicité, &c., dans le Royaume des Pays-Bas* (Brux. 1827); *Recherches sur la Reproduction et la Mortalité et sur la Population de la Belgique* (Brux. 1832); *Statistique Criminelle de la Belgique* (Brux. 1832); *Sur l'Homme et le Développement de ses Facultés ou Essai de Physique Sociale* (Par. 1835); *Du Système Sociale et des Lois qui le régissent* (Par. 1848), and *Physique* (Brux. 1855). Q. has also been one of the most efficient collaborateurs in drawing up the *Bulletin de la Commission Centrale de Statistique*, the *Annales des Mines*, the *Journal des Economistes*, the *Annales des Travaux Publics*, the *Trésor National*, &c. He has also published numerous papers on meteorology, astronomy, terrestrial magnetism, &c., in the *Mémoires* and *Bulletins* of the Belgian Royal Academy.

QUEVEDO Y VILLEGAS, Don Francisco Gomez de, a Spanish classic, was born at Madrid, 26th September 1580, and studied at the university of Alcala de Henares, where he acquired a good knowledge not only of Latin and Greek, but also of Hebrew and Arabic, besides French and Italian. His career, which was chiefly that of a diplomatist, was marked by numerous vicissitudes. He died 8th September 1645, at Villa Nueva de los Infantes.

The prose works of Q. are divisible into two classes—the serious and the burlesque. Among the former are his *Vision of St Paul*, *The Spanish Epictetus*, *Phocylides*, *Fortune become Reasonable*, and particularly *The Life of Marcus Brutus*, and *The Policy of God*—the last two of which are remarkable for the purity and elevation of their sentiments. Among his satirical and burlesque productions, in which his genius finds its happiest expression, the principal are—*The Dream of the Death's Heads*, *The Demon Alguazil*, *Pluto's Stables*, *The Side-scenes of the World*, *The Letters of the Knight of the Forceps*, *Recollections of Student Life*, and *The Grand Sharper, or the History of Don Pablo de Segovia*, a romance of rascaldom, a species of fiction much cultivated in Spain at that time, in which the hero is usually an adventurous scamp. The lively sallies, the piquant allusions, and the happy metaphors found in these books, have enriched Spanish literature with a crowd of proverbs and colloquial phrases. Q.'s poetry is also chiefly of a humorous character. His works have been often reprinted; the most complete edition is that by Sancho (Madrid. 11 vols. 1791—1794); a more recent collection is the one by M. Guerra y Orbe (Madrid, 1852). An English translation of Q.'s satirical works was published at Edinburgh in 1798; his *Sueños*, or Visions, among the most popular of all his productions, were also translated into English by Sir Roger l'Estrange (1708).

QUIBERON, a small fishing town of France, in the dep. of Morbihan, at the extremity of a long slender peninsula, 25 miles south-west of Vannes. Pop. about 700. It is historically celebrated as the spot where a body of French emigrant royalists, under D'Hervilly and Puisaye, landed from an English fleet, on the 27th of June 1795, and endeavoured to rouse the people of Brittany and La Vendée against the Convention, but were defeated, and driven into the sea by General Hoche. All the prisoners taken were shot, by order of the Convention. At an earlier period, during the war of the Austrian Succession, an English force attempted a landing here (1746), but was severely repulsed. In 1759, Admiral Hawke completely defeated a French fleet under Admiral Conflans in Quiberon Bay.

QUI'CKENS. See Couch-grass.

QUICK-MATCH, a combustible match, made by dipping cotton-wick in a composition of vinegar, saltpetre, and sometimes an admixture of gunpowder; when lighted, it continues to burn to the end, and hence is useful in exploding mines, &c. The rate at which it burns being known, it is only necessary, for insuring safety, to take the right length of quick-match.

QUI'CKSILVER. See Mercury.

QUI'ETISTS, the name of a somewhat numerous class of mystical sects, who, in different ages, have held that the most perfect state of the soul is a state of quiet, in which the soul ceases to reason, to reflect, whether upon itself or on God, and, in a word, to exercise any of its faculties, its sole function being passively to receive the infused heavenly light, which, according to their view, accompanies this state of inactive contemplation. Under the various heads, Fenelon, Hesychasts, Brethren of the Free Spirit, Molinos, Mysticism, most of the details of the doctrines of the Q. have been explained. Some of these are of a purely speculative character, and involving but little of practical consequence, whether for good or for evil. But there is one most pernicious class of errors, which, however eschewed by the leaders of the various schools, has seldom failed to characterise the practical working of the system among the vulgar crowd of its followers. From the belief of the lofty and perfect nature of the purely passive state of contemplation, there is but a single step to the fatal principle in morals, that in this sublime state of contemplation all external things become indifferent to the soul, which is thus absorbed in God; that good works, the sacraments, prayer, are not necessary, and hardly even compatible with the repose of the soul; nay, that so complete is the self-absorption, so independent is the soul of corporeal sense, that the most criminal representations and movements of the sensitive part of the soul, and even the external actions of the body, fail to affect the contemplating soul, or to impress it with their debasing influence. These results will be found detailed under some of the heads named above. The chief Quietist sects have been the Messalians or Euchites, in the 4th c.; the Bogomili, in the 11th c.; the Beghards and Beguines, in the 13th c.; the Hesychasts, in the East, about the same period; the Brethren of the Free Spirit, in the 14th c.; Michael Molinos, in the 17th c.; and others of less note.

QUILIMA'NÉ, a seaport of Eastern Africa, in the Portuguese territory of Mozambique, stands about 15 miles from the mouth of the river of the same name. The town itself, or village, stands on a large, moist mudbank (in any part of which water can be found by digging two feet deep), surrounded by mango-bush and marsh. The climate is unhealthy in an eminent degree. The bar at the harbour is extremely dangerous, and the volume of water is so small, that the bed of the small stream which communicates between the Quilimane and the Zambesi (q. v.) is dry for at least nine months in the year. During the dry season, trade is carried on by land-carriage. Pop. about 15,000, including the inhabitants of the country in the immediate vicinity of the town.

QUILLA'IA, a genus of plants of the natural order *Rosaceæ*, the type of a tribe called *Quillaieæ*, with herbaceous calyx-tube, capsular fruit, and seeds winged at the apex. The sub-order is remarkable for saponaceous secretions. The barks of some

species of *Quillaia*, as *Q. saponaria* and *Q. Brasiliensis*, are used in South America, under the name of *Quillai*, as a substitute for soap. They contain a substance closely allied to *Saponine*.

QUILLED, in Heraldry, a term used in describing a feather, to indicate that the quill differs in tincture from the rest.

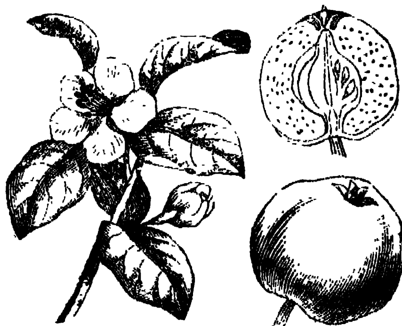
QUILLS, the large feathers of the wings of birds, the hollow tubes of which, being properly cleaned of all oily or fatty matter, and dried, are used for making pens to write with. The exact time of their introduction to use for this purpose is not known. Those plucked from geese are most generally used, but swan and turkey-quills are not uncommon; and for very fine writing, and for pen-and-ink drawing, crow-quills are preferred to all others. At one time, the collection and preparation of quills formed a very large and important branch of commerce; but the introduction of metallic pens has reduced it to very small limits. The following are the chief kinds sold by the dealers, and the list gives a correct indication of the sources of supply: Swan-quills, Iceland, &c.; English goose-quills, Irish goose-quills, Hudson's Bay goose-quills, Dutch goose-quills, St Petersburg goose-quills, Riga goose-quills, Turkey goose-quills, British crow-quills, duck-quills. Our imports amount to nearly 30,000,000 per annum, the value of which is about £25,000. Those of the swan fetch the highest price, or about four guineas per thousand; whilst the best goose-quills rarely exceed 20 shillings. After they have been carefully scraped and cleaned, the drying is effected by gentle heat in ovens, by which they acquire a necessary brittleness in a longitudinal direction. This is most important, as, without this property, we could not make the fine slit, upon which the whole working character of the pen depends.

QUI'LTOR, a fistulous wound about the top of the horse's foot, results from treads, pricks, or neglected corns, which lead to the formation of matter underneath the hoof. Any dead horn, matter, or other cause of irritation must be sought for by cutting away the hoof. A free opening must be provided for the egress of any pent-up matter. Poulticing for a few days is often useful; whilst healing may afterwards be expedited by the injection of any mild astringent lotion. The powerful caustics so frequently used, cause much unnecessary pain, and often aggravate the evil.

QUIMPER, an old town of France, capital of the department of Finistère, is prettily situated on the Odet, about 9 miles from its mouth, and about 35 miles south-east of Brest. Its cathedral, a stately and richly-carved and ornamented edifice, commenced in 1424, is the principal building. Potteries are in operation, as well as tanyards, breweries, &c.; and sardine-fishing is actively carried on. Pop. (1861) 9979.

QUIN, JAMES, a celebrated actor of Irish descent, was born in London, 24th February 1693, and made his first appearance on the stage in 1714 at Dublin as Abel in *The Committee*. Shortly after, he proceeded to London, where he was engaged at Drury Lane, but for quite inferior parts. In 1716, however, the sudden illness of a leading actor led to Q.'s being called on to sustain the character of Bajazet in the once famous play of *Tamerlane*. His success was marked. Next year, he exchanged Drury Lane for Mr Rich's theatre at Lincoln's Inn Fields, where he remained as a principal actor 17 years. Not long after leaving the former place, he had the misfortune to kill a brother-actor, Mr Bowen, in a duel—a circumstance which clouded his reputation for a while. The only really fine parts which he seems to have played were Captain Macheath in the *Beggars' Opera*, and Falstaff in the *Merry Wives of Windsor*. In 1734—1735, he returned to Drury Lane Theatre, 'on such terms,' says Cibber, 'as no hired actor had before received;' and from this date until the appearance of Garrick in 1741, he was, by universal consent, the first actor in England. Q. was by no means pleased at the rising fame of Garrick, and sarcastically expressed his chagrin by declaring that 'Garrick was a new religion, and that Whitefield was followed for a time; but they would all come to church again.' In this, however, he was mistaken. In 1751, he withdrew from the stage as a hired actor, though he continued at intervals to give his services for benevolent purposes, and fixed his residence at Bath, where he died January 21, 1766. In after-dinner conversation, he was a coarse but capital story-teller, and many of his jests are still in vogue.

QUINCE (*Cydonia*), a genus of trees and shrubs of the natural order *Rosaceæ*, sub-order *Pomeæ*, nearly allied to *Pyrus*, with which many botanists have united it, but distinguished by having many instead of two seeds in each cell, and by their very mucilaginous nature. The COMMON Q. (*C. vulgaris*), a native of the south of Europe and temperate parts of Asia, is a low tree, with generally tortuous branches; ovate, entire, deciduous leaves, which are downy on the under side; and rather large, whitish



Common Quince (*Cydonia vulgaris*).

flowers, which are solitary at the extremity of young branches. The fruit is in some varieties globose; in others, pear-shaped, of a rich yellow or orange colour, with a strong smell. It is hard and austere, but when stewed with sugar, becomes extremely pleasant, and is much used in this way either by itself, or to impart a flavour to apple-pies. It is also much used for making a preserve called *Quince Marmalade*. A delicious beverage, somewhat resembling cider, is made from it. The seeds readily give out their mucilage to water, so that they turn 40 or 50 times their weight of water into a substance as thick as syrup. Q. mucilage, or Q. gum, *Cydonin*, is allied to Bassorin, but differs from it in being readily soluble in water, whilst it differs also in some particulars from Arabin. See GUM.—The Q. was cultivated by the ancient Greeks and Romans, and is at the present day cultivated in the south of Europe, in England, and generally in temperate climates. In Scotland, the fruit seldom ripens except on a wall.—The JAPANESE Q. (*C. Japonica*, better known by its older name, *Pyrus Japonica*), a low bush, a native of Japan, but perfectly hardy in Britain, is often to be seen trained against walls, being very ornamental from the profusion of its beautiful flowers.

QUI'NCY, a city of Illinois, U.S., on the east bank of the Mississippi River, 160 miles north of

St Louis, is handsomely built on a high bluff, and has a large trade by the river, railway connections with Chicago, Toledo, &c., extensive manufactures, three banks, five newspapers, and twenty-one churches. Pop. in 1860, 13,718.

QUINCY, JOSIAH, an American lawyer, orator, and man of letters, and son of Josiah Quincy, a distinguished orator of the Revolution, was born at Boston, February 4, 1772; graduated at Harvard College, 1790; studied the profession of law; took an active interest in politics as a leading member of the [illegible] party in New England; entered Congress in 18[illegible], where he became distinguished as a ready, earnest, and fervent orator, in opposition to the policy of Jefferson and Madison. He was one of the earliest to denounce slavery in Congress, and declared that the purchase of Louisiana was a sufficient cause for the dissolution of the union. Disgusted with the triumph of the democratic party and the war of 1812, he declined a re-election to Congress, and devoted his attention to scientific agriculture. He became, however, a member of the senate of Massachusetts, and in 1822, judge of the Municipal Court of Boston. In 1823, he was elected Mayor of Boston; and in 1829 accepted the post of President of Harvard College, which he held until 1845. Among his published works are a Memoir of his father, 1825; *History of Harvard University*, 1840; *History of the Boston Athenæum*, 1851; *The Municipal History of the Town and City of Boston*, 1852; *Life of John Quincy Adams*, 1858; *Essays on the Soiling of Cattle*, 1859. Born before the American Revolution, in which his father took an active and distinguished part, he lived to denounce the secession of the Confederate States in 1860, and urge on the war for their subjugation. He died at Boston, July 3, 1864.—His son, EDMUND QUINCY, is a distinguished author and orator, and active member of the Abolitionist party.

QUINET, EDGAR, a French author, was born at Bourg, in the department of Ain, 17th February 1803, and studied at Lyon and Paris. He made his literary *début* at the age of 20 by his *Tablettes du Juif Errant*, after which his love of philosophy and mystic reverie led him to Germany. He studied at Heidelberg, and on his return to France published a translation of Herder's *Ideen zur Philosophie der Geschichte der Menschheit*, so well executed, that Cousin signalised it as *le début d'un grand écrivain*. From this early period dates his intimate friendship with Michelet (q. v.), the result of a community of feeling and belief. Q. was a member of the scientific commission sent to the Morea in 1828, and while there, gathered materials for his *Grèce Moderne et ses Rapports avec l'Antiquité* (Par. 1830). Although his political enthusiasm was extremely ardent, he continued unabated his learned literary labours; and after the July revolution, became a contributor to the *Revue des Deux Mondes*. From 1838 to 1842, he held the chair of Foreign Literature at Lyon, where his lectures on the ancient civilisations excited a profound interest. From this situation he passed to the chair of *Littératures Méridionales* at the College of France, expressly instituted for him by M. Villemain; and here, in company with Michelet, he assailed the Jesuits with a keen, earnest, epigrammatic eloquence that startled the chiefs of that body, and made even the government nervous, who knew the peril of being exposed to their secret hostility. In 1846, Q. was silenced. He threw himself eagerly into the Reform agitation that brought about the revolution of 1848, and was elected a member of the Constituent and Legislative assemblies, where he always voted with the Extreme Left; but was expelled from France, after the 2d of December. He has since resided at Brussels. Q.'s principal works are *Allemagne et Italie* (Par. 1839); *Histoire de la Poésie Epique* (1836–1837); *Examen de la Vie de Jésus de Strauss* (1838); *Le Génie des Religions* (1843); *Les Révolutions d'Italie* (3 vols. 1852); *Histoire de mes Idées* (1858); *Merlin l'Enchanteur* (1861); *La Campagne de 1815* (2 vols. 1862). In 1858 he superintended, with the help of his friends, Daniel Manin, Ary Scheffer, and others, an edition of his *Œuvres Complètes* in 11 vols.

QUI'NIA, or **QUININE**, and the other CINCHONA ALKALOIDS. In the barks of the different varieties of *Cinchona* which are employed in the treatment of disease, several alkaloids or organic bases occur in combination with quinic and quinotannic acids. Of these bases, the most important are quinia and cinchonia, each of which is accompanied by (or connected with) two isomeric bases, termed respectively *Quinidine* and *Quinicine*, and *Cinchonidine* and *Cinchonicine*; and besides these, a base termed *Aricine* or *Cinchovatine* occurs in the bark of *Cinchona ovata*. We shall describe (1) the *chemical characters*, and (2) the *therapeutic action* of these alkaloids.

1. *Quinia* ($C_{40}H_{24}N_2O_4$) is characterised by the following properties. It crystallises with six atoms of water, in the form of silky needles, from an ethereal or alcoholic solution allowed to evaporate spontaneously in a cool place; but when thrown down from acid solutions, it forms a white curdy precipitate. It is comparatively insoluble in water, requiring about 200 parts of boiling water for its solution, but dissolves readily in alcohol and in ether, and in water acidulated with a mineral acid. It has an intensely bitter taste, which is chiefly perceived at the back of the mouth; it has a well-marked alkaline reaction. It combines with acids, and forms both neutral and acid salts, most of which are capable of crystallisation, and all of which possess its own bitter taste. Of these salts, the acid ones are far the most soluble.

The most important of its salts is the *neutral sulphate*, represented by the formula $C_{40}H_{24}N_2O_4, HO,SO_3 + 7Aq.$ (It was formerly termed the disulphate, till Strecker shewed that the correct formula for quinia was $C_{40}H_{24}N_2O_4$, and not $C_{20}H_{12}NO_2$.) It crystallises in long snow-white silky needles, sparingly soluble in water (yet imparting to it a peculiar bluish tint), but dissolving freely in diluted sulphuric acid and in alcohol. The *acid sulphate*, $C_{40}H_{24}N_2O_4, 2(HO,SO_3)$, is also crystallisable, and the crystals, when dried for some time at a temperature of 212°, are phosphorescent. Its solution, or an acidulated solution of the former salt, exhibits the phenomena of *Fluorescence* (q. v.) in a striking manner. On heating a solution of sulphate of quinia with strong acetic acid, and adding, drop by drop, an alcoholic solution of iodine to the hot solution, we obtain crystals of a compound represented by the formula $C_{40}H_{24}N_2O_4I, 2(HO,SO_3) + 10$ Aq. These crystals, which are formed in large flat rectangular plates, present very remarkable optical properties, polarising light as perfectly as plates of tourmaline.

This alkaloid may be obtained from several species of cinchona, but is most abundant in the yellow bark (*C. cardifolia*). The pulverised bark is boiled with water containing 1 per cent. of oil of vitriol, which dissolves the bases that are present; the solution is precipitated by carbonate of soda, and the quinia (with the other alkaloids) extracted from the precipitate by ether. For various methods of obtaining the sulphate of quinia on a large scale for medicinal purposes, we must refer the reader to Pereira's *Materia Medica*, 4th edition, vol. 2, part 2, pp. 147—149, and the *British Pharmacopœia*, p.

315. The mother liquid from which sulphate of quinia has been obtained, contains a considerable quantity of a resinous amorphous substance known as *Quinoidine*, which, when treated with ether, yields crystals of *Quinidine* ($C_{40}H_{24}N_2O_4 + 4Aq$), a base isomeric with quinia, from which again is derived another isomeric base, *Quinicine*.

Cinchonia ($C_{40}H_{24}N_2O_2$) crystallises in comparatively large quadrilateral prisms, which are anhydrous. It is less soluble in alcohol than quinia, and is insoluble in ether, and this difference of solubility affords the means of separating these two alkaloids. With acids it forms two series of salts similar to, but more soluble than, those of quinia. These salts are intensely bitter, and possess (although in a less powerful degree) the same therapeutic properties as those of quinia. In certain varieties of cinchona bark, a crystalline alkaloid named *Cinchonidine*, isomeric with cinchonia, occurs. On exposing its salts, or those of cinchonia, to a high temperature, corresponding salts of *Cinchonicine* are formed. The last-named substance has the same composition as the two preceding ones, and is precipitated from its salts in the form of a resinous mass. Cinchonia and its isomeric allies are most abundant in the pale Peruvian Bark (*Cinchona condaminia*). The method of obtaining cinchonia is precisely the same as that for obtaining quinia. When both bases are present, they may be separated by converting them into sulphates; the salt of quinia is the least soluble, and crystallises first.

The relations of the above-described alkaloids to polarised light have been carefully studied by Pasteur, and are very remarkable. Their respective effects on the plane of polarisation are as follow: Quinia produces a powerful left-handed rotation; quinidine produces a powerful right-handed rotation; quinicine produces a feeble right-handed rotation; cinchonia produces a powerful right-handed rotation; cinchonidine produces a powerful left-handed rotation; cinchonicine produces a feeble right-handed rotation. The action of these alkaloids thus affords an excellent illustration of the importance of circular polarisation as an aid to chemical analysis.*

2. The only preparations of the above-described alkaloids included in the *British Pharmacopœia* are the *Sulphate of Quinia*, the *Compound Tincture of Quinia* (which is merely a solution of the sulphate in tincture of orange-peel in the proportion of one grain to a fluid drachm), and the *Citrate of Iron and Quinia*. Sulphate of quinia is a preparation which, from its expense (about 12 shillings an ounce), is always liable to adulteration; and specimens containing gypsum, chalk, magnesia, gum, starch, boracic and stearic acids, sugar, salicine, and sulphate of cinchonia, are not unfrequently met with. The first five may be detected by their insolubility in alcohol; boracic acid by the green tinge which it gives to the alcoholic flame; stearic acid by its insolubility in dilute acids; sugar by its solubility in cold water; salicine by the addition of oil of vitriol, which turns it red; and the sulphate of cinchonia by precipitating the suspected specimens by liquor ammoniæ, and then adding ether, when the quinia will be dissolved, but the cinchonia will float between the two liquids. (This test for cinchonia is recommended by the French government, who refuse to allow the sale of sulphate of quinia containing more than three per cent. of cinchonia.) The most important use of sulphate of quinia is in the treatment of intermittent fever, for which it may be regarded as a specific. Various nervous affections, especially if they assume a periodical character, are successfully treated by it—as, for example, neuralgia, chorea, certain forms of headache, &c. In numerous forms of dyspepsia, debility, and cachexia, there is no single remedy more effectual than the citrate of iron and quinia. The ordinary dose of the sulphate is from one to three grains, but in ague it may be given in far larger doses.* It may be prescribed in the form of pills made with conserve of roses, or as a mixture, in which case a little sulphuric acid should be added to render it soluble. In large doses, as from 10 to 20 grains or more, it excites the nervous system, giving rise to headache, buzzing of the ears, blindness, giddiness—a group of symptoms collectively known as *Quininism;* and several deaths are recorded as arising from its administration in excessive doses. The average dose of the citrate of iron and quinia is 5 grains, which may be given in a glass of sherry. *Quinoidine* (also termed *Amorphous Quinine*) seems to be as efficient a tonic as sulphate of quinia, but not to have so great an anti-periodic power, and hence not to be so serviceable in intermittent fever, &c. *Quinidine* possesses the medicinal properties of quinia. Pereira and other physicians have found that its sulphate is equally serviceable with that of quinia, both as a tonic and a febrifuge; and the action of *Quinicine* is similar to that of quinoidine. *Cinchonia* appears to act precisely the same as quinia, while *Cinchonidine* and *Cinchonicine* are of little therapeutic value.

Quinia is employed not merely in the cure of disease, but for the preservation of the health, when the system is exposed to certain noxious influences. Its value as a means of guarding the system from the attack of intermittent fever is so generally recognised, that our Admiralty regulations require that every man should take quinia when the ship is within a certain distance of the east and west coast of Africa, and that it should be regularly continued in eight-grain doses every morning to those engaged in boat-cruising along the coasts or on the rivers or creeks. The author of 'A Visit to the Cities and Camps of the Confederate States,' in *Blackwood's Magazine* for January 1865, observes, that formerly it was considered certain death to sleep out for one night on James's Island, opposite Charleston, during the malaria season; and now thousands of men are quartered on it. Last year (1863), when the taking of quinia was optional, there was a great deal of fever; this year, all are compelled to take their dose regularly every morning, and they are very healthy. It would appear, however, that quinia is not equally efficacious in guarding the system against all forms of intermittent fever, for Mr Meller, surgeon-naturalist in medical charge of Dr Livingstone's Zambesi expedition, found a glass of rum given at sunrise to be 'a far better prophylactic' than quinia in the fever of East Central Africa.

QUI'NISEXT (Lat. *quinque*, five, and *sex*, six), the name given to a council which, being regarded as a sort of supplement of the fifth and sixth generals,

* MM. de Vry and Alluard have just published a *Report*, in which they state that the polaroscope reveals the presence of impurities in quinia when too small to be detected by any chemical process.

* Mr Desvignes (in a *Memoir* communicated on January 10, 1865, to the Royal Medical and Chirurgical Society) advocates the administration of solutions of quinia by subcutaneous injection. The solution he employed was a grain and a half in 15 drops of water, acidulated with a drop of dilute nitric acid. With this he successfully treated several hundred cases of intermittent fever in the district of Tuscany, known as the 'Maremma,' in many of which the use of quinia and arsenic, administered in the ordinary way, had failed to effect a cure.

is called by a title which appears to combine both. In the same view, it is called by the Greeks *pentekte* (from *pente*, five, and *hecte*, sixth). The fifth general council, held in 553, on the subject of the Three Chapters (q. v.), enacted no canons of discipline. In like manner, the sixth, held against the Monothelites in 680, was confined almost entirely to doctrinal decisions. In order to supply the want, a numerous body of bishops, 211 in number, assembled in 692, in a hall of the imperial palace at Constantinople, called the Trullus. It was a purely oriental council, and not only was not approved by the Western Church and the pope, but was almost immediately reprobated. Its decrees are purely disciplinary; and it is chiefly important as being the council in which was laid down the broad distinction between the legislation of the East and that of the West on the subject of clerical celibacy. The Q. council, while prohibiting the marriage of any one who is in priest's orders, permits a married man to receive after marriage the order of subdeacon, deacon, or priest, but not of bishop. Against this, the Roman pontiffs vigorously protested. Another peculiar canon of this synod 57th) prohibits fasting on Saturday, even though in Lent. On these and other points of difference in discipline, no agreement has taken place between the churches down to the present time.

QUINOA (*Chenopodium Quinoa*), an annual plant, a native of Chili and the high table-land of Mexico. It much resembles some of the British species of *Chenopodium* (q. v.), has an erect stem, with ovate, angulate-toothed leaves, the younger ones pulverulent, and panicles much crowded and branched. In the countries in which it is indigenous, it is much cultivated for its seeds, which form the principal food of the inhabitants. The meal made from some varieties of the seed has a somewhat peculiar flavour, but it is very nutritious. Q. meal resembles that of oats in not becoming elastic and tenacious when mixed with water, and like oatmeal, can only be made into cakes, not into leavened bread. The plant is sometimes cultivated in our gardens for its leaves, which are a good substitute for spinach.

QUINQUAGE'SIMA SUNDAY (Lat. fiftieth), the Sunday immediately preceding Ash-Wednesday.

QUINQUE'NNIAL PRESCRIPTION, a period of five years allowed by the law of Scotland within which payment of sums on all bargains concerning movables, arrears of rent in some leases, multures, ministers' stipends, arrestments, must be enforced.

QUI'NQUEREMES, vessels with five banks of oars, however arranged (see TRIREME), may be regarded as the first-rates of the ancient navies. The Greek states used them after the death of Alexander, and the Carthaginians a little later. A Carthaginian vessel of this class served during the first Punic War as a model to the Romans, who built 100 on the coast of Bruttii in the year 260 B.C., and thenceforward maintained fleets of such ships. According to Polybius, a quinquereme carried 300 seamen and 120 soldiers.

QUI'NSY, or COMMON INFLAMMATORY SORE THROAT, known also as CYNANCHE TONSILLARIS and TONSILLITIS, is an inflammatory affection of the substance of the Tonsils (q. v.). The inflammation is, however, seldom limited to these glands, but extends to the uvula, the soft palate, the pharynx, and not unfrequently the salivary glands. The disease usually manifests itself by difficulty in swallowing, and a sense of heat and discomfort in the throat, often amounting to considerable pain. On examination, the throat at first exhibits unnatural redness, with enlargement of one or both tonsils. The uvula is enlarged and elongated; its end either dropping down into the pharynx, and by exciting the sensation of a foreign body, giving rise to much irritation, or else adhering to one of the tonsils. The tongue is usually furred, and the pulse rapid, and there are the ordinary symptoms of that form of constitutional disturbance known as inflammatory fever. The inflammation terminates either in resolution (if the attack is not severe, and yields readily to treatment) or in suppuration, which may be detected by the occurrence of slight rigors, and by the increased softness of the enlarged tonsil. The matter which is discharged has a very fetid smell, and the fetor is often the first indication of the rupture. The pain almost entirely ceases with the discharge of matter, and recovery is then rapid. The disease is usually at its height in about a week after the manifestation of the first symptoms, and it almost invariably terminates favourably. The ordinary exciting cause of this disease is exposure to cold, especially when the body is warm and perspiring; and certain persons (or even families) are so subject to it that slight exposure is almost sure to induce it.

The disease may sometimes be cut short if, at its very commencement, a sharp purgative (as, for example, compound infusion of senna with Epsom salts) be administered, followed up almost immediately by an emetic of a scruple of ipecacuanha with a grain of tartar emetic. The patient should remain in the house (or in cold weather, even in bed), and should be kept on low non-stimulating diet. A stimulating liniment, such as the compound camphor liniment, should be applied to the outside of the throat, and the neck should be surrounded with a piece of flannel. In mild cases, the above described treatment is sufficient. In more severe cases, the patient may gargle frequently with hot water, or milk and water, or, which is better, may inhale the vapour of boiling water. Blistering and leeching will sometimes give relief, but if suppuration is once established, they do harm rather than good. If the tonsils are very much enlarged, they should be pricked with a lancet made expressly for the purpose.

Dr Trench, in his *English Past and Present*, gives quinsy (or quinsey, as he spells it) as an example of the gradual recasting of a foreign word into a new English mould. The Greek word *cynanche* was the origin of the French *esquinancie*, which entered the English language as *squinancy*, became *squinzey* in the time of Jeremy Taylor, and has now softened down to *quinsy* or *quinsey*.

QUI'NTAL, a French weight corresponding to the Eng. 'hundredweight,' was equal to 100 pounds (livres); on the introduction of the metrical system, the same name was employed to designate a weight of 100 kilogrammes (see GRAMME). The metrical quintal is thus more than twice as heavy as the old one, being equivalent to about 204½ livres.

QUINTANA, MANUEL JOSÉ, surnamed the 'Spanish Tyrtæus,' was born at Madrid, 11th April 1772, studied at Salamanca, and established himself as an advocate in his native city, where his house became a resort of the advanced liberals of the time. Among his earliest productions were his *Odes*, which gave him a place in the first rank of Spanish poets. On the outbreak of the War of Independence, he made good use of his lyric gift to stimulate the patriotism of his countrymen, and otherwise distinguished himself as editor of the *Semenario Patriotico*, and author of the manifestoes of the insurrectionary juntos, and of most of the

official statements of the first Cortes. Meanwhile, he did not abandon literature, properly so called. Besides his Spanish Plutarch (*Vidas de los Españoles Celebres*, Madr. 1807—1834), a work which is reckoned one of the finest Spanish classics, he published one or two tragedies, and an excellent selection of Castilian poetry (*Poesias Selectas Castillanas*, 3 vols. Madr. 1808). On the restoration of Ferdinand VII. in 1814, Q.'s liberalism caused his imprisonment for six years. On his release in 1820, he was received in Madrid with acclamations, and appointed President of Public Instruction. But his enthusiasm in the cause of liberty was now considerably quenched, and in its place appeared a spirit of subservience to royalty which greatly detracted from his previously patriotic character. In 1835 he was reappointed Director-general of Public Instruction, an office which he held till 1851. He was also made a peer and a senator, and acted as tutor to the young queen Isabella from 1840 to 1843. On the 25th of March 1855, Q. was honoured with a public ovation in Madrid, had a speech made to him by the Cortes, and a crown of golden laurel placed on his brows by the hand of Isabella herself. He died 11th March 1857. Q.'s works are to be found collected in the *Biblioteca de Autores Españoles* of Rivadeneyra (Madr. 1852).—See Kennedy's *Modern Poets of Spain*, and Ticknor's *History of Spanish Literature*.

QUINTE'SSENCE (Lat. *quinta*, fifth, *essentia*, essence) signifies literally the fifth essence. The word is of ancient origin, and dates from the time when it was generally believed that the simple elements or constituents of bodies were *four* in number, viz., fire, air, earth, and water, and that earth was the lowest element, being grosser than water, water than air, and air than fire. Some Pythagorean philosophers, not satisfied that these four elements or essences sufficed for the composition of all substances in nature, added to them a fifth element or essence, *ether*, which was supposed to be more subtle and pure than fire (the highest of the four), and was therefore located in the uppermost regions of the sky. The word 'quintessence' has thus come down to us in the signification of the most subtle ingredient or extract of any body, though in ordinary language it is employed in a figurative sense.

QUI'NTETT, a musical composition for five voices, or for five instruments, each of which is *obligato*. The most remarkable quintetts for stringed instruments are those of Boccherini, Mozart, Beethoven, and Onslow; and for wind instruments (the flute, oboe, clarionet, horn, and bassoon), those of Reicha.

QUINTI'LIAN (QUINTILIANUS, M. FABIUS) was born 40 A.D., at Calagurris (the modern Calahorra) in Spain, and attended in Rome the prelections of Domitius Afer, who died in 59. After this date, however, he revisited Spain, whence he returned in 68 to Rome, in the train of Galba, and began to practise as an advocate, in which capacity his reputation became considerable. He was more distinguished, however, as a teacher than as a practitioner of the oratorical art, and his instructions came to be the most eagerly sought after among all his contemporaries, while among his pupils he numbered Pliny the Younger and the two grand-nephews of Domitian. As a mark of the emperor's favour, he was invested with the insignia and title of consul; while he also holds the distinction of being the first public teacher who benefited by the endowment of Vespasian, and received a fixed salary from the imperial exchequer. His professional career as a teacher of eloquence, commencing probably with 69, extended over a period of 20 years, after which he retired into private life, and died probably about 118. The reputation of Q. in modern times is based on his great work entitled *De Institutione Oratoria Libri XII.*, a complete system of rhetoric, which he dedicates to his friend Marcellus Victorius, himself a court favourite and orator of distinction. It was written (as he tells us in his preface to his bookseller Trypho) after he had ceased to be a public teacher; and was the fruit of two years' labour. During its composition, however, he was still acting, in the lifetime of Domitian, as tutor to the grand-nephews of that emperor. In the first book, he discusses the preliminary training through which a youth must pass before he can begin those studies which are requisite for the orator, and he gives us an elaborate outline of the mode in which children should be educated in the interval between the nursery and the final instructions of the grammarian. The second book treats of the first principles of rhetoric, and contains an inquiry into the essential nature of the art. The subjects of the five following books are invention and arrangement; while those of the eighth, ninth, tenth, and eleventh are composition (embracing the proper use of figures of speech) and delivery. The last, and, in the author's view, the most important, book is devoted to the various requisites for the formation of a finished orator, such as his manners, his moral character, his mode of undertaking, preparing, and conducting causes, the style of eloquence most advantageous to adopt, the age at which pleading should be begun, and at which it should be left off, and other allied topics. The entire work is remarkable for its sound critical judgments, its purity of taste, and the perfect familiarity it exhibits with the literature of oratory. The condensed survey of Greek and Roman literature with which the tenth book commences, has always been admired for its correctness and animation. The declamations, amounting to 164, which have been ascribed to him, are now believed to be spurious, as they evidently belong to different authors, and even different epochs. There is better ground, however, for ascribing to him the anonymous *Dialogus de Oratoribus*, often included in editions of Tacitus. The best editions of Q. are those of Burmann (Leyden, 1720); and of Spalding and Zumpt (Leip. 1798—1829).

QUINTIN MATSYS, a celebrated painter of the early Flemish school. He was born at Antwerp about 1460, and is generally known by the name of the Blacksmith of Antwerp, from having followed that trade in early life. The romantic story so long connected with this artist's name, of his having adopted the profession of painting in order to obtain the hand of a painter's daughter, is founded on nothing more authentic than the verses of Lampsonius, affixed to his portrait by Jerome Cock (1510—1570), and the inscription on his monument in the cathedral at Antwerp, 'Connubialis Amor de Mulcibere fecit Apellem.' The fact of his admission into the painters' fraternity of St Luke in 1491-1492, is proved by an entry in the register of that body. It appears from two authentic documents that he was alive on 8th July 1530, but had died previous to 12th October 1531. In the works of this distinguished painter, art is exhibited as transitionary between the style of Van Eyck and Rubens—his aim being, without neglecting the accessory details, to give more importance to the human figure, and more unity and effect to the general composition of his picture. Albert Dürer and Holbein thought highly of his works; among them, the best is an altar-piece with two folding-doors or wings, at one time in the cathedral, now in the Picture-gallery at Antwerp, and one of the *chefs-d'œuvre* of that

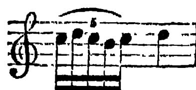
collection. It is specially referred to by Sir Joshua Reynolds in his Notes on his Tour through Flanders and Holland. Q. M. was on intimate terms with Erasmus, Sir Thomas More, and Petrus Ægidius. Many elaborate specimens of ornamental iron-work are attributed to this artist; but from the facts connected with his career as a painter, it may be inferred that he merely furnished designs for the works in iron referred to.

QUI'NTIN, or **QUINTAINE**, was an instrument used in the ancient practice of tilting on horseback with the lance. It consisted of an upright post,



Ancient Quintin at Offham, Kent.

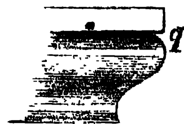
surmounted by a cross-bar turning on a pivot, which had at one end a flat board, at the other a bag of sand. The object of the tilter was to strike the board at such speed that the rider was past before the bag of sand, as it whirled round, could hit him on the back.

QUI'NTUPLET, in Music, a rhythmical group of five notes, formed of a note divided into five instead of its proper complement of four parts; the five notes having collectively the value usually expressed by four such notes. Thus, the five semiquavers of the group  are equivalent in value to one crotchet, or four ordinary semiquavers.

QUI'NTUS CU'RTIUS RU'FUS, the Roman historian, flourished probably in the time of Vespasian; while a less plausible conjecture represents him as having lived in the reign of Constantine. Nothing further is known, or can even be fairly surmised regarding his life. His work entitled *De Rebus Gestis Alexandri Magni Regis Macedonum*, consisted of ten books; but of these the first two are lost, and the other eight are occasionally imperfect. Its style is flowing and ornate, but it wants the pure Latinity of Cicero, and the simplicity of Cæsar. Along with the Greek history of Arrian, it forms our most valuable source of information respecting the military career of Alexander the Great, although it is not entirely free from geographical, chronological, and strategical blunders. The best edition is that of Zumpt (Brunswick, 1849).

QUIRE (Fr. *cahier*), of paper, consists of twenty-four sheets, each doubled once, and one placed within the other.

QUIRI'NUS was, among the Sabines (and according to Mommsen, among the Latins also), a surname of Mars, and is probably derived from the Latin word *quiris*, a spear. It is therefore equivalent to the 'Spear-bearer.' According to the ancient legend, the name was first given to Romulus (q. v.), as the son of Mars, after his apotheosis, and the festival instituted in his honour was called the *Quirinalia*.—The QUIRINAL (Lat. *Collis Quirinalis*), is one of the seven hills on which ancient Rome stood, and next to the Palatine and Capitoline, the oldest and most famous quarter of the city. It lies due north of the Palatine, and its western slope looks down on the Campus Martius, which stretches from its base to the banks of the Tiber. According to the ancient legend, it was the seat of the Sabine portion of the mixed population of early Rome; but this idea is strongly combated by Mommsen, who rejects as a 'baseless speculation' the 'etymologico-historical hypothesis started by Varro, and, as usual, unanimously echoed by Latin writers, that the Latin *quiris* and *Quirinus* are akin to the Sabine town *Cures*, and that the Quirinal Hill accordingly had been peopled from Cures' (*History of Rome*, vol. i.). The most notable structures on the Quirinal were *The Temple of Quirinus*, said to have been built by Numa in honour of Romulus, *The Temples of Flora, Salus, Fortuna, and Sol.* Here, also, were the famous Gardens of Sallust (*Horti Sallustiani*), the *Circus Floræ*, the *Circus Sallustii*, the Baths of Diocletian, and the Prætorian Camp.



Quirk.

QUIRK, a small angle or recess between mouldings (as at *q*). It is much used in Greek and Gothic architecture, and sometimes in Roman.

QUI'SCALUS, a genus of birds of the family *Sturnidæ*, having the tail longer than in the starlings (*Sturnus*), and *graduated*—the middle feathers longest—its sides turned up. From this last character, some of the species are often called BOAT-TAIL. The Great Boat tail, or Great Crow Blackbird (*Q. major*), a bird about 16 or 17 inches long, is common in the southern parts of North America.—More common, and indeed abundant in all parts of the United States, is the PURPLE GRAKLE, or CROW BLACKBIRD (*Q. versicolor*), a bird about twelve inches in length, tail included; black, with reflections of blue, violet, &c. Vast flocks of this species are to be seen at the seasons of migration in some parts of North America. Its migrations extend to very northern regions in summer. It is to be found in Louisiana at all seasons. Its depredations in fields of maize and other kinds of grain, make it an object of especial dislike to North American farmers. Its flesh is dry and coarse, although often used for food; but its eggs are esteemed a delicacy.

QUITCH. See COUCH GRASS.

QUI TAM actions are actions so called in the law of England from the first words of the old form of declaration by which informers sue for penalties, the plaintiff describing himself as suing as well for the crown as for himself, the penalty being divided between himself and the crown.

QUITO, the capital of Ecuador (q. v.), and of a province of the same name, stands between two parallel ranges of the Andes, on the east side of the volcano of Pichincha (q. v.), at an elevation of 9492 feet above the sea, and in lat. 0° 15′ S., long. 78° 45′ W. Its site, in the midst of mountains, is very uneven; its appearance, however, is picturesque, and its beautiful environment of mountains, together with its clear, healthy, and temperate climate, averaging 60° Fahr., and described as an eternal spring, make it one of the most charming cities of South America. From the hills in the vicinity, a beautiful panoramic view, embracing eight icy peaks of the Andes, may be obtained; and to the south of the city extends the lovely valley of Chillo, laid out in gardens. The chief edifices are built of stone, the others of adobes, or sun-dried bricks, covered with tiles. Q. contains many churches, monasteries, convents, two hospitals, two colleges, and several plazas or squares. By the earthquake of March 1859, most of the then existing churches, convents, and government buildings, as well as many private residences, were thrown down, property to the value of 3,000,000 dollars was destroyed, and many lives lost. From this calamity, the city has in great part recovered. Q. is the seat of the only archbishop in the country, and of the government. Coarse cotton and woollen goods and jewellery are manufactured, and the trade in grain, indigo, metals, and liquors is extensive. Pop. 80,000.

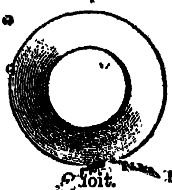
The most important events in the history of Q. are mentioned in the articles ECUADOR and PERU (q. v.).

QUIT RENT is the small rent which is payable by the tenants of old manors, by which they go *quiet* and free. In old records, it is called *white* rent, because it was paid in silver money, as distinguished from corn rents.

QUOIN (Fr. *coigne*, from Lat. *cuneus* = Gr. *gonia*) is generally a wedge or an angle. In artillery, the quoin is a wedge inserted beneath the breech of a gun, for raising or depressing the muzzle. The Armstrong gun is elevated by a screw instead of a quoin; but considering the rough service of actual warfare, it is doubtful whether the clumsier quoin is not more to be depended on. Quoins on shipboard are wedges used to prevent casks from damaging each other.

QUOIN, in Architecture, is one of the stones forming the solid corner of a building. Where the work is of brick or small materials, the quoins are usually of ashlar. They sometimes project, and are moulded, when they are called 'Rustic Quoins.' See RUSTICATION.

QUOITS, a game much practised by the working classes in the mining districts of Great Britain, seems to have been derived from the ancient game of 'throwing the *discus*,' which was such a favourite amusement of the Greeks and Romans. The discus was a circular plate of stone or metal, 10—12 inches in diameter, and was held by its further edge with the right hand, so as to lean upon the fore-arm, and was cast with a swing of the arm, aided by a twist of the whole body. It was generally thrown edge foremost, and upwards at an angle of 45°, so as to give it as great a range as possible, and the player who threw it furthest was the winner. Similar to this game was the 'throwing of the *solos*,' a heavy spherical mass of stone or iron, perforated through the centre, to admit a rope or thong, by the aid of which it was thrown. In this game, also, the furthest throw was the successful one. It is still practised by the mountaineers of the Appenzell, in Switzerland. The game of quoits differs very considerably from both of these. A quoit is a flattish ring of iron, generally from 8½ to 9½ inches in external diameter, and between 1 and 2 inches in breadth. It is convex on the upper side, and slightly concave on the under, so that the outer edge curves downwards, and is sharp enough to stick into the ground.



Quoit.

The mode of playing is as follows: Two pins, called 'hobs,' are driven into the ground from 18 to 24 yards apart; and the players, who are divided into two parties, stand at one hob, and in regular succession throw their quoits (of which each player has two) as near to the other hob as they can. The points are counted as in bowls or in curling. To facilitate the sticking of the quoits at the point where they strike the ground, a 'clay end'—that is, a flat circle of clay, about 1 or 2 inches in thickness, and 1½ feet in radius—is placed round each hob. This requires to be kept moist, and should have sawdust strewed over it. The quoit, when to be thrown, is grasped with the right hand by one side, and pitched with an upward and forward jerk of the hand and arm, which give it a whirling motion, and cause it to strike the ground with its edge. Professional players acquire such dexterity in this game, that they can very frequently 'ring' their quoit—that is, land it so that the quoit surrounds the hob.

2

Hob.

QUO'RRA. See NIGER.

QUO'RUM (Lat. *quorum*, of whom) is a legal term, denoting a certain specified number out of a larger number as entitled or bound to act for certain purposes. Thus, in statutes appointing commissioners or trustees of a public work, it was usual to name a certain number of the whole body as sufficient to discharge the business, when it may be inconvenient for all to attend. In Scotland, the word is commonly used in reference to trustees appointed under trust settlements, when one or two individuals, either in point of number, or for some personal reason, must concur in formal acts. In England, the word is now seldom used except in regard to justices of the peace. It was an ancient practice of the crown to select a few of the justices, generally the most skilled in the law, and designate them as 'of the quorum,' so as to secure their presence on certain occasions when peculiar business requiring skill was to be done. This selection, however, by degrees came to be considered invidious; and by statutes of George II. and George III., it was expressly enacted that things which formerly required to be done only by justices of the quorum, might be done by ordinary justices. And latterly, the crown has made all the justices justices of the quorum, so as to put them all on the same footing.

QUOTI'DIAN FEVER. See AGUE.

QUO' WA'RRANTO is a writ or information issued from the Court of Queen's Bench in Westminster, calling upon a person or body of persons to shew by what warrant they exercise a public office or privilege. It is the legal mode of remedying any usurpation of privilege or of office.

R



THE eighteenth letter in the English and other Western alphabets, is one of the group of liquids. See LETTERS. Its name in Hebrew was Resh, meaning forehead, and the rude outline of a head is thought to be yet recognisable in the Phœnician form of the letter. Of all the consonants, R approaches most nearly to the vowels. In Sanscrit, there is an R-vowel, distinguished from the R-consonant by a different character. The Greek also had two varieties of R, one with the 'spiritus asper' (ῥ), or rough breathing, at the beginning of words, and when following another R; and another with the weaker breathing (ῤ) in other positions. The Romans in spelling Greek words represented the former by *rh*, and hence we still write *Rhodes*, *rheumatism*, *catarrh*. This *rh* was probably of the guttural kind commonly called a 'burr.' This pronunciation of *r* occurs as a peculiarity of individuals everywhere, but it is universal in Northumberland and Durham, and characterises the pronunciation of the letter in certain positions throughout Germany and Scandinavia. The normal pronunciation of R in English and in the Romanic tongues (and it appears to have been the same in Latin) is a vibratory sound produced by applying the tip of the tongue near the roots of the upper fore-teeth. From the resemblance to the growl of an angry dog, R was called by the ancients the dog's letter. In modern English, there is an increasing tendency to smooth down the roughness of the vibration, until, in such words as *far*, *serf*, *world*, the *r* has dwindled to a kind of nondescript vowel, modifying the preceding vowel. This emasculating process—for such it undoubtedly is—is in so far only the operation of the universal law of phonetic decay, arising from the natural tendency to spend as little energy as possible; but it has been accelerated in this case by a fashion which is apt to mistake languor and indifference for refinement. This affectation goes so far as to turn words like *very*, *rare*, into *vewy*, *waaw*. R is one of the most difficult articulations; children are long in learning it, and some individuals never can pronounce it. Whole nations (e. g., the Chinese and some Polynesian tribes) have no such consonant in their language, using *l* instead. The interchanges of *r* with *l* are noticed under L. A more remarkable substitution is that of *r* for *d*, which was very prevalent in early Latin, as we learn from Priscian and from inscriptions. Ex. *arvocatos* for *advocatos*. The Latin of the literary period had returned from this corruption, except in *arbiter* (from an old verb, *adbitĕre*, to go to, to intervene), *arcesso*, and *meridies* (for *medidies*, from *medius*). The substitution is easily accounted for, when we consider that in both sounds the tongue is applied to the same part of the palate; only in the one it is applied firmly; in the other, loosely, so as to vibrate.

A very common phenomenon, especially in Latin, is the sinking or degradation of an original *s* between two vowels into *r*. On inscriptions, we find *Lases*, *asas*, *esum*, for what at a later period was written *Lares*, *aras*, *eram*. *Jus*, *mos*, became in the genitive *juris*, *moris*, instead of *jusis*, *mosis*. Even final *s* was sometimes degraded to *r*, as in the double forms, *arbor* = *arbos*, *honor* = *honos*. Curiously, we know the date when the tendency to change *s* between two vowels into *r* set in; for Cicero remarks that L. Papirius Crassus, who was consul 336 B.C., was the first that was called Papirius, the ancestral name having been Papisius. The interchange in question occurs also to some extent in the Teutonic tongues. Compare Eng. *forlorn* with *lose* (Ger. *verlieren*), *was* with *were*; Ger. *wesen* (to be) with *war* (was); Goth. *hausjan* with Ger. *hören* (to hear); Eng. *hare* with Ger. *hase*. The unstable nature of this articulation is manifested in its frequently changing its place with regard to an adjoining vowel; compare *board* with *broad*; *bird* with old *brid*; *grass* with A.-S. *gærs*.

RA. See EGYPT.

RAAB (Hung. *Györ*), a town of Hungary, stands on a marshy plain at the confluence of the Raab and the Little Danube, a branch of the great river of that name, 67 miles west-north-west of Buda. It consists of an inner and outer town—the former well defended—is well built, but suffers from an insufficient supply of drinking-water. It contains numerous religious edifices—among which is a beautiful cathedral. The manufactures are chiefly tobacco and cutlery; and the trade of the town, favoured by its position on the highway between Vienna and Buda, is important both by land and by steamers on the river. Pop. 16,300.

RAA'LTE, a cantonal town of the Netherlands, in the province of Overyssel, 11 miles north-north-east of Deventer. Pop. 5570, of whom one-fourth belong to the Reformed Church, and the remainder, excepting 50 Jews, to the Roman Catholic. The trade is chiefly in agricultural produce, cattle, wool, wood, and bark for tanning. R. is one of the prettiest places in the province, having many beautiful houses, and in the neighbourhood, seats of the nobility. Hans Willem, Baron van Bentinck, the founder of the ducal house of Portland, was born at R. in 1651.

RAA'SAY, one of the Western Isles, belongs to the group of the Inner Hebrides, and lies between the Isle of Skye and the mainland; the sound of Raasay separating it from the former, and Applecross Sound from the latter. It is 13 miles in length by 2½ miles in greatest breadth. Pop., which is gradually decreasing, was, in 1861, 388. The western side of the island is bare and uninteresting. On the eastern and more sheltered side, there are numerous farms, some patches of plantation, and bold and striking scenery. Brochel Castle, on the east shore—now a mere ruin—is the chief object of interest in the island. It is perched on the summit of a lofty cliff, which beetles over the sea,

and is entirely inaccessible, save by a pathway winding around the cliff.

RABA'T, or **RABATT**, a seaport and manufacturing town in the kingdom of Fez, Morocco, stands at the mouth of the Bu-Regreb, 135 miles south-south-west of the entrance to the Strait of Gibraltar. It is surrounded by walls; protected by batteries, and by a citadel, called *El-Mansur;* and contains numerous mosques, minarets, bazaars, &c. Owing to the silting up of the mouth of the river, the commerce of R. has much declined. Manufactures, however, of carpets, bournus, woollen fabrics, waterproofs, mixed linen and silk goods, saddlery, &c., are actively carried on. R. was formerly the centre of the European trade with Morocco, and it still exports olive oil, wool, almonds, wax, maize, &c. In 1863, 85 vessels, of 7170 tons, entered and cleared the port. Pop. 28,000, of whom 7000 are Jews.

RA'BBA, a flourishing town of Africa, in the kingdom of Gando, stands on the left bank of the Niger, 80 miles above Egga, in lat. 9° 16'. The district by which it is surrounded is beautiful and highly cultivated. R. carries on an extensive general trade; is the most notorious slave-market in this part of Africa, and is said to contain 40,000 inhabitants.

RA'BBI (Heb., *My Master*), an honorary title of the Jewish Masters of the Law, which is first found applied after the time of Herod, subsequently to the disputes between the two schools of Shammai (q. v.) and Hillel (q. v.). It was in common use at the time of Christ, who is addressed as such by his disciples and the common people. Other forms of the same title are Rab, Rabban, Rabbon, ('Rabbuni')—the first, like rabbi, being more a general term for a certain recognised authority, the latter applying more strictly to a head of an academy. The title Rabban was first given to the grandson of Hillel, Gamaliel (q. v.), and was only borne by seven other exalted chiefs of schools. Properly speaking, the following dignities alone were of old considered 'official:' 1. *Sopher*, scribe, one who occupied himself with copying and commenting on the Scriptures, and who, when elected to the Sanhedrim (q. v.), received the title of Chacham (Sage); 2. *Rabban*, Nomodidaskalos, one who held popular orations, homiletically or otherwise treating of the Law. Out of the number of the regular disciples (Talmidim) were chosen the Chaberim (Colleagues), who, again, were elected to the dignity of a rabbi by the 'Semichah,' or imposition of hands by three members of the Sanhedrim. At present, nothing but the degree of 'Morenu,' our Teacher, bestowed upon a candidate who proves his erudition in the written and oral Law and all its bearings before a college of rabbis, is wanted to render him eligible for the post of a rabbi, which, however, carries no authority whatsoever with it, save on a very few ritual points. We need hardly allude to the popular fallacy of the rabbi of our day being a kind of 'priest' in the sense of the Old Testament. He is simply the teacher of the young, delivers sermons, assists at marriages and divorces, and the like, and has to decide on some ritual questions. Up to the times of the removal of the 'Disabilities' in Europe, he had on some occasions also to give judgment in civil matters, in accordance with the 'Choshen Mishpat,' a legal text-book, derived from the Talmudical and post-talmudical authoritative decisions.

RABBIT (*Lepus cuniculus*), an animal of the same genus with the hare, but of smaller size, and with shorter limbs, the hind-legs shorter in proportion. It is not adapted, like hares, to seek safety by rapid and continuous running, but by retreating to burrows, which it excavates with great dexterity. Except in some varieties, which result from domestication, the ears are only about as long as the head. The wild R. is of a grayish-brown colour, paler or whitish on the under parts; the ears not tipped with black, like those of the common hare; the tail rather larger and more conspicuous—brown above, white beneath. The R. exhibits a remarkable difference from the hare in its gregarious habits; and another in the comparatively imperfect state of the young at their birth, which are blind for



Tame Rabbits.

some days, and are almost destitute of hair. It delights in sandy heaths, dry grounds covered with scattered furze or juniper, and other such situations; to which, however, it is by no means restricted, and is often very troublesome by its depredations on crops in the finest fields, having its abode in some neighbouring wood, but it never makes its burrow in a wet soil. Although now very abundant in most parts of Britain, and generally throughout Europe, the R. is said to have been introduced into Britain from Spain, and even to have been originally brought to Europe from the north of Africa. In a wild state, the R. is monogamous, and the attachment of a pair is said to continue during life; but in a state of domestication, it ceases to pair. The fertility of rabbits is proverbial; they begin to breed when six months old, and are capable of producing several litters in a year, of 4 to 12 or more in a litter; so that, in favourable circumstances, they multiply with prodigious rapidity; and although they have many natural enemies, would in many places become an intolerable pest to farmers, were not means adopted to reduce their numbers. Rabbits often inflict great injury on plantations by barking young trees, seeming to take pleasure in tearing off far more than they can eat. An infusion of tobacco repels them from trees. The flesh of rabbits is in high esteem, and the fur being used for various purposes, rabbit-warrens are found profitable in lands not suited for agriculture. See RABBIT-SKINS.

Instances have occurred of the R. and hare breeding together, but they are very rare, and the creatures seem rather to regard one another with antipathy.

Tame rabbits exhibit great variety of colours—gray, brown, reddish-black, more or less mixed with white, and often white with all the characters of albinism. Peculiarities of other kinds also appear in some of the varieties, among which excessively long and drooping ears are one of the most remarkable. *Fancy rabbits* are prized and tended like *fancy pigeons*. But when rabbits are kept for economical purposes, those which differ less widely

from the original type are preferred. Rabbits eat almost any kind of vegetable food; the coarser blades of cabbages, turnip-leaves, celery-tops, carrot-tops, and other produce of the garden, not suitable for human use, are readily consumed by them, as well as chick-weed, sow-thistle, dandelion, and many other weeds. With very little trouble, and still less expense, a man can easily secure one or two rabbits a week for his family from the produce of his stock. When the rabbit-enclosure contains a plot of grass and clover, it affords them an important part of their food. Great care is requisite to keep their boxes dry, neglect of which, and a too exclusive feeding with green and succulent food, cause diseases, often fatal, particularly to the young. Dry food, such as corn, ought to be frequently given; and aromatic herbs—such as parsley, thyme, milfoil, &c.—not only tend to preserve the health of rabbits, but to improve the flavour of their flesh. It is usual to give no water to tame rabbits; but it is better to supply them regularly with it, and the females particularly need it after producing young.

The *Angora R.* is a remarkable variety, with very long silky hair, which is easily stripped off in summer, and is of considerable value. The rearing of this kind of R. is extensively practised in some parts of France, in order to the manufacture of gloves, &c.

An old English name for the R. is *cony*, and its name in many other languages is similar to this, as Lat. *cuniculus*, Ital. *coniglio*, Ger. *Kaninchen*, Welsh *Cwningen*; but the R. is not the Cony (q. v.) of Scripture.

The Gray R. (*Lepus sylvaticus*) of North America is the most plentiful species of the genus *Lepus* in New Jersey, Pennsylvania, and the more southern states; but although it somewhat resembles the common R. in colour, and is rather inferior to it in size, its habits are intermediate between those of the R. and of the hare. It does not burrow, although, when hard pressed by a pursuer, it retreats into any accessible hole, and sometimes digs, in order to escape from or enter an enclosure.

Rabbits, in point of law, give rise to many nice questions, which in practical life are of no small importance, for they form a branch of the Game Laws (q. v.). In England and Ireland, whoever is owner of the soil is entitled to catch and kill all the rabbits he finds upon it, without any game licence; but if he is not the owner or tenant of the lands, nor acting by their express direction or permission, then he must have a licence. As between landlord and tenant, the rule is, that unless the lease expressly say that the rabbits shall belong to the landlord, they belong to the tenant, who can kill and catch them at discretion. A tenant, however, though having a right to kill rabbits on his farm, cannot give leave to strangers to come on his farm and enjoy a day's sport there, though nothing but rabbits are killed, the privilege of killing the rabbits being personal to the tenant. Nevertheless, the tenant may employ his servant or a rabbit-catcher to kill the rabbits if they exist in excessive quantities, for in that case he deals with them as vermin. Though rabbits are not game, still they are protected against poachers in precisely the same way; for if any one trespass on land to kill rabbits, he is liable to be fined £5; and he may be arrested, if caught in the act on the lands, and detained, provided he do not tell his name and address, and quit the lands. The rabbits which he has poached cannot, however, be taken from him by any person, except, only, when he is on the highway and then only by a constable, who suspects he has poached them. In the latter case, viz., where the poacher is stopped on the highway by a constable (and he cannot be stopped by any other person there), he cannot be taken into custody, but merely is liable to be summoned before justices, and fined. Poachers who take rabbits in the night-time now commit an indictable offence, and not merely an offence which justices can punish summarily. There is no close-time as to rabbits, and any person may buy and sell them without any licence. In Scotland, the law does not materially differ from that of England as to rabbits, and the tenant is entitled to kill them if there is no express reservation of them to the landlord. Poachers of rabbits are punished summarily in the same way, and constables on highways may stop poachers as in England. The only difference between the law of England and Ireland is, that in Ireland a game licence is not required in any case for killing rabbits, whether the lands are the sportsman's own lands or not. See also Game, Poaching. Paterson's *Game-laws of the United Kingdom.*

RABBIT-SKINS have a regular commercial value in consequence of the hair being well adapted for felting purposes; hence they are collected in large numbers by the chiffoniers of this and other countries; and the hair itself is not unfrequently imported from Holland and Germany, under the erroneous name of 'cony-wool.' Its chief use is in making the bodies of felt hats; and this is now done by machinery of very ingenious construction. It consists of a hollow cone of copper, of the size of the felt cones required by the hatters. The cone is covered with perforations, and it fits on to a metal shaft of the diameter of its base, by means of a collar, which can be turned round by a band, so as to carry the perforated cone with it. At the bottom of the metal shaft is a fan, moved by machinery, which produces a strong downward draft, so that if the hairs are thrown against the cone, they are held tightly by the current of air through the perforations; and as the cone regularly revolves, its outer surface becomes entirely coated with the rabbit-hair. When a sufficient thickness is obtained, the smooth copper cone is easily drawn out, leaving a cone of wool, which is felted by the usual processes of wetting, beating, &c. Another ingenious contrivance in this machine is to make the draft of air caused by the fan blow the rabbit-fur forward to the cone, so as to distribute it with an evenness which could not otherwise be attained.

The skins, after the hair has been removed from them, are sold to the glue-makers, and are used—mixed with shreds of other skins—in the manufacture of glue and size. Besides these uses, the skins of rabbits are dressed as furs, in various ways, to supply the demand for cheap articles; and so skilfully is this branch of trade carried on, that admirable imitations of the rarer and more costly furs are made. Thus, ermine and miniver are made from white rabbit-skins, the black ones furnishing the spots; and the common variety is dressed and dyed various ways, to represent the furs of dark-coloured animals. In the reign of Henry VIII., rabbit-fur was valued very highly, and was worn by the nobles of the realm; this is referred to in the charter of the Skinners' Company.

There has been a very large market in the United States for the imitation furs prepared from rabbit-skins, to which country British manufacturers have largely exported.

RABELAIS, François, the greatest of French humorists, was born, according to the general statement of biographers, in 1483, but more probably towards 1495, at Chinon, a small town in Touraine. His father, Thomas Rabelais, was proprietor of a

the country residences of the royal family. Silk fabrics and twist, and woollen cloths, are manufactured. Pop. 10,350.

RACCOO'N, or RACOON (*Procyon*), a genus of quadrupeds of the Bear family, *Ursidæ*, but differing widely from the typical members of that family, in being less perfectly plantigrade, the whole sole of the foot being indeed rested on the ground when the animal is still, but being partly raised when it walks, whilst when running it only touches the ground with the tips of its toes, and moves in a bounding manner. The dentition also differs from that of bears, there being, for one thing, only six instead of seven molars on each side in the lower jaw. The dentition indicates an aptitude both for animal and vegetable food. The general appearance may be described as intermediate between that of a fox and of a bear in miniature. The raccoons are exclusively American. The Common R. (*P. lotor*) is a native of North America, from Canada to the south of Mexico. It is about the size of a small fox, grayish-brown; the muzzle white. The hair is of two kinds, an under-coat soft and woolly, of a uniform gray; and long and rather stiff hairs projecting through the wool, and alternately marked with black and grayish-white. The R. frequents the seashore, and the margin of swamps and rivers. It commits great ravages on fields of Indian corn, plantations of sugar-cane, &c., and is not less destructive to poultry. It feeds much on oysters, particularly in the alluvial coast-lands of Carolina and neighbouring regions where the American oyster abounds on the banks of rivers and creeks, and exhibits great dexterity in opening oysters. It is also very fond of crabs and other crustaceans. It has a curious habit of dipping or washing its food in water, whence its specific name *Lotor* (Lat. washer). When pursued, it often takes refuge in a tree, climbing with great agility, but its destruction is then considered sure, whence the American proverbial reference to a *tree'd 'coon*. The fur of the R. is used in the manufacture of hats, and is a considerable article of commerce.—Another species, the



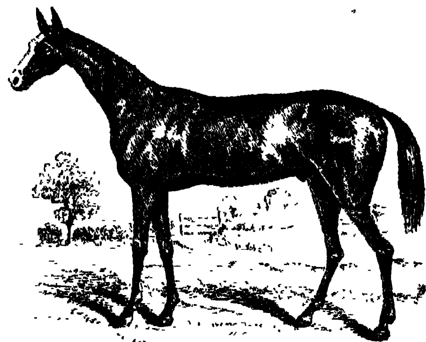
Raccoon (*Procyon lotor*).

CRAB-EATING R. (*P. cancrivorus*), the Crab-dog of Guiana, is found in all parts of South America east of the Andes. It is rather larger than the common R., although very similar to it.—Both species of R. display the same love of glittering things which is so remarkable in magpies, jackdaws, and others of the crow family. Mr Wood mentions in his *Natural History* that a common R. did its best to get a ring off his finger by hitching one of its crooked claws into the ring, and pulling with all its strength; and a gentleman once resident in Guiana informed the writer of this article that a crab-eating R., which he caught young, and completely tamed, shewed such a propensity to steal silver spoons, that he was obliged to send it away into the woods.

RACE. 'A *race* is a class of individuals concerning which there are doubts as to whether they constitute a separate species, or a variety of a recognised one. Hence the term is *subjective*; i. e., it applies to the *opinion of the investigator* rather than to the *object of the investigation*; so that its power is that of the symbol for an unknown quantity in algebra. The present writer having as yet found no tribe or family for which a sufficient reason for raising it to a new species has been adduced, has either not used the word *race* at all, or used it inadvertently. Its proper place is in *investigation*, not in exposition.' —Latham, *Natural History of the Varieties of Man*.

RACE, the portion of a loom from which the shuttle is projected through the shed, or separated threads of the warp.

RACEHORSE, a breed of horses distinguished for extreme fleetness. It owes its origin, in great



Racehorse.

measure to Arabian, Barbary, and Turkish horses introduced into England. The great interest taken in Horse-racing (q. v.) since the time of James I., has led to the greatest care of the animals employed in it, and the utmost improvement of the breed. The racehorse is generally longer-bodied than the hunter, and the same power of leaping is not required. See HORSE-RACING.

RACE'ME (Lat. *racemus*, a bunch of grapes), in Botany, a form of Inflorescence (q. v.) which is *centripetal* (see CENTRIFUGAL AND CENTRIPETAL), and in which the flower-stalk throws off branchlets (*pedicels*) of nearly equal length, and each bearing a single flower. Familiar and very perfect examples of the R. may be seen in the Red or White Currant and in the Barberry. Notwithstanding the origin of the name, a bunch of grapes is not a true R., but a Panicle (q. v.).

RACE'MIC ACID. See TARTARIC ACID.

RACHEL, ELISA (properly ELISA RACHEL FELIX), a celebrated French *tragédienne*, was born at Munf, in Switzerland, of poor Jewish parents, on the 28th February 1820. The family removed to Lyon, in France; and in order to aid in its support, the child R. and her sister Sarah were in the habit of singing for chance gratuities in the streets and cafés of the place. In 1831, the household was transferred to Paris, and for R., lessons were procured in singing from an eminent teacher of the day. In music, she gave no promise of special excellence; and in 1833, she made her first appearance on the stage as an actress. Though her talent had previously been discerned by certain of the more judicious (among others, Jules Janin and the celebrated Mademoiselle Mars), it was only in 1838 that in the character of Camille, in Corneille's tragedy

of *Les Horaces*, she first strongly attracted the attention of the public. The admiration excited by her performance rapidly grew into enthusiasm ; and from this time forward, in the great parts supplied by the classic masterpieces of Corneille, Racine, and Voltaire, she shone without a rival. In 1843, her fame may be said to have culminated in her appearance as *Phèdre* in the tragedy of that name by Racine. In *Adrienne Lecouvreur*, a piece expressly written for her by MM. Legouvé and Scribe, she had also immense success, though in other more modern parts, her popularity was somewhat less. The *furor* excited in Paris in 1848 by her public recitation of the *Marseillaise Hymn*, in the interest of the revolutionary government, will continue to connect her name with the public history of the period. In 1849, she made the tour of the French provinces, and subsequently visited England and Russia, everywhere meeting with success and enthusiastic recognition. Her health, however, had begun to fail: in 1855, in the course of a professional visit to America, it altogether gave way, and she returned utterly prostrated. A residence at Cairo failed to restore her to strength; and on the 3d January 1858, she died at Cannet, near Toulon. As an artist, within the limits prescribed by her genius, she has probably never been quite equalled. Of the burning intensity which characterised her rendering of passion in its fiercer concentrations, no words can give an adequate image. 'She does not act—she suffers,' some one very well said of her. Her *Phèdre*—by common consent her masterpiece—was an apocalypse of human agony, not to be forgotten by any one who ever witnessed it. In character, R. was neither exemplary nor amiable. Of the details of her private life, it is as well that nothing should be said. In her professional relations, she was notoriously grasping and avaricious. Her immense popularity enabled her, during much of her career, pretty much to dictate her own terms to managers, and of this power, she is said to have availed herself without scruple or generosity. In this way she very rapidly amassed a large fortune. If little else of good is on record of her, she was constant in her home affections, and throughout she frankly made her whole family sharers of her prosperity.

RA'CHIS (Gr. the back-bone), in Botany, the *primary floral axis*, an elongation of the stem or of a branch, from which arise the flower-stalks (peduncles), or to which the flowers are immediately affixed.

RACINE, Jean, the most admired of all the French dramatists, was born at Ferté-Milon, 21st December 1639, of a respectable family belonging to the *bourgeoisie*. At the age of four he lost both his parents, and then went to live with his maternal grandfather, by whom he was sent to the college of Beauvais. Here he remained till he was 16, at which time his grandfather died. He was then taken to Port-Royal (q. v.), where his grandmother and his aunt Agnes were leading a recluse life, and placed at the school which had been opened in that celebrated retreat by the pious scholars assembled there. R. astonished his teachers by the rapidity of his progress in all his studies, especially in Greek; but he won their regards still more by the affectionate seriousness of his character, which gave a delicacy to his ardent sensibilities and vivid imagination. They loved him, yet they trembled for him. When they saw him wander—Sophocles or Euripides in his hand—among the shadows of the abbey, anxiety took possession of their hearts; and when they learned that he secretly indulged in the sinful pastime of making verses, they even thought it necessary to punish their favourite. Their punishment was indeed an odd one, for they obliged him to turn the hymns of the Roman breviary into French verse! Novels were placed under the same ban as poetry. One day the sacristan Lancelot found him reading the Byzantine romance of Bishop Heliodorus (q. v.), entitled *The Loves of Theagenes and Charicleia*, and threw the book in the fire; but R. says that it was already fixed in his memory, and that he smiled at this futile attempt to rob him of it. We can easily see that R. was not at all ascetically disposed as yet. After a residence of three years at Port-Royal, during which time he had, among other things, read and annotated the best Greek and Latin classics, he went to the Collége d'Harcourt to finish his curriculum with the study of logic. Then he went out to 'see life,' got into loose company, became irregular himself, and even grew so reckless as to burlesque, in his correspondence, the pious phraseology in vogue at Port-Royal. Deep was the grief and incessant were the remonstrances of his old friends, but they were long without avail. He had made some little name as a poet by an Ode on the marriage of the king, and had had the good fortune to get a pension for it, but still his income was small and precarious; and when a maternal uncle, who was a canon-regular of the church of St Genevieve at Uzès, in Languedoc, held out to him the hope of a benefice, R. went to live with him in 1661, and tried to study systematic theology. But the effort was a hopeless one. While he gazed vacantly into the *Summa* of St Thomas, his thoughts were with Ariosto and Sophocles. In the summer of 1662, he returned to Paris in disgust, and commenced life as a dramatic writer, having meanwhile made the acquaintance of Molière and Boileau. His first piece was the *Frères ennemis*, played in 1664; but it was not till 1667, when his *Andromaque* appeared, that the power and peculiar character of his genius excited marked attention. For the next ten years, his career as a dramatist was unsurpassably brilliant, yet, strange to say, we know almost nothing of his private or social life during that time. We have to content ourselves with little more than a few meagre facts relative to his literary performances, the chief of which are *Britannicus*, *Berenice*, *Bajazet*, *Mithridate*, *Ephigenie*, and *Phèdre*. Suddenly, at the early age of 38, in the full sunshine of his fame and vigour of his power, he resolved to abandon both the stage and the world, and become a Carthusian monk. The effect of his Port-Royal training was now seen. In the midst of all his literary ambitions and strifes, his little excesses, irregularities, and amours, R. had carried with him a keen and faithful conscience; and partly from disappointment, partly from remorse, he longed to forget all in acts of devotion. With difficulty, he was prevailed upon to modify the rigour of his purpose, and instead of seeking for religious felicity through the privations of solitude, and the severities of penance, to do so through marriage with some pious woman, and the cultivation of domestic virtues. A suitable lady—very devout, but not very intelligent—was found for the poet in the daughter of the city-treasurer of Amiens, and the marriage took place in 1677. Seven children, two sons and five daughters, were the fruit of this union. Shortly after it, R. was appointed historiographer to the king. Henceforth, his course of life was pursued with the utmost regularity—one-third of the day being given to God, another to his family and friends, and the remainder to the king. His *Esther* (1690) and *Athalie* (1691) are the only dramas which he produced after his conversion, and they are profoundly imbued with religious

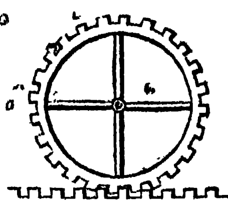
feeling. *Athalie* is reckoned by some his finest effort, and certainly the only one which can at all be placed in comparison with it is the *Phèdre*. The poet died, after a brief illness, on the 21st of April 1699.

R.'s dramatic genius was essentially French, or pseudo-classical, and therefore it is not easy for Englishmen trained to appreciate the power, magnificence, and variety of the Shakspearian tragedy, to sympathise with it or to criticise it impartially. In the eyes of his countrymen, he is the most perfect, if not the most sublime, of all their dramatists. Corneille may at times exhibit a grander and more rugged energy, but in beauty, grace, and a certain tender majesty of style, R. is held to be without a rival; and it must be remembered that *style*, and not portraiture of human character, is the thing in which French dramatists aim to shine. The declamations in which the heroes and heroines of R. indulge, are marvellously fine pieces of rhetoric; but, compared with the Elizabethan drama, they are deficient in deep insight into human nature and in genuine passion, while humour is altogether excluded. See *Mémoires* of R., edited by his son Louis. The editions of his works are innumerable, and some are of great splendour; that of Girodet (Paris, 3 vols. 1801—1805) being reckoned one of the finest specimens of typography in the world.

RACI'NE, a city of Wisconsin, U.S., situated on Lake Michigan, at the mouth of Root River, which forms an excellent harbour, and on the line of the Chicago and Milwaukee Railway, 23 miles south of Milwaukee. It has 3 ship-yards, factories, and furnaces. Pop. (in 1860) 7822.

RACK, (Sax. *wrecan*, Ger. *recken*, to stretch), an instrument of torture, used for extracting confessions from criminals and suspected persons. It consisted of a large oblong frame of wood, with four beams a little raised from the ground, on which the sufferer was stretched and bound. Cords were attached to his extremities, and gradually strained by means of a lever and pulleys, till the operation, if persisted in, caused dislocation of the limbs. The rack was known in the 1st and 2d centuries in the south of Europe, and applied to the early Christians. It was in use in England in the 15th and 16th centuries. According to Coke, it was first introduced into the Tower by the Duke of Exeter, Constable of the Tower, in 1447, whence it came to be called the 'Duke of Exeter's daughter.' It is mentioned by Holinshed in 1467; but its use first became common in the time of Henry VIII. as an implement of torture for prisoners confined in the Tower. The infliction of the punishment of the rack took place during the reign of the Tudor sovereigns by warrant of council, or under the sign-manual. In 1628, however, on the murder by Felton of the Duke of Buckingham, it being proposed in the Privy Council to put the assassin to the rack, in order that he might discover his accomplices, the judges resisted the proceeding, as contrary to the law of England. In various countries of Europe, the rack has been much used both by the civil authorities in cases of traitors and conspirators, and by members of the Inquisition to extort a recantation of heresy. It is no longer in use in any part of Europe.

RACK, or **RACK-WORK**, is a straight bar, with cogs or teeth placed along it, so as to correspond with similar cogs or teeth placed on a wheel, thus: If the bar is not movable, the wheel is attached to a traversing frame, and as it revolves, is moved along by the resistance of its teeth to those on the bar. It was in this way that the formation of a railway was first projected; the rail and the driving-wheel of the engine to be both furnished with corresponding teeth. In mechanics, rack-work has innumerable applications.



Rack-work.

RA'CKETS (Fr. *raquette*), a game frequently played in England; it is merely a modern variety of the old game of TENNIS (q. v.).

RACK RENT is the full yearly value of lands let upon lease, or to an occupier, or held by a tenant for life, as distinguished from the value fixed by the lease or agreement between the parties, and which is often less or greater than the real value.

RACOO'NDA, or **NUTRIA**, the fur of the Coypu (q. v.).

RACZ, or **O BECZE**, a town of Hungary, in the Servian Wojwodschaft, on the right bank of the Theiss, 26 miles north-east of Peterwardein. It carries on an extensive trade in corn. Pop. 11,000.

RADACK AND RALICK, two parallel chains of islands in the group called Marshall's Islands. See POLYNESIA.

RADCLIFFE, DR JOHN, a celebrated physician, and the founder of the Radcliffe Library at Oxford, was born at Wakefield in Yorkshire, in the year 1650. He was instructed in Greek and Latin at the grammar-school of his native town; and at the early age of 15, was sent to University College, Oxford. In 1672, he took his degree of M.A., applied himself to the study of medicine, and having taken his degree of M.B. in 1675, began to practise as a licentiate at Oxford. He immediately made himself conspicuous by the originality of some of his ideas, treating the cases in which he was engaged with a total disregard of the usually received rules of the profession, and even holding up these to censure and ridicule. At the very commencement of his practice he made some remarkable cures; and in less than two years, was on the high road to celebrity. In 1682, he took the degree of M.D., and remained still two years longer at Oxford in the practice of a lucrative profession.

In 1684, Dr R. removed to London. He established himself in Bow Street, Covent Garden, where, in less than a year, he became the most popular physician of his time. It is said that his conversational powers, ready wit, and pleasantry contributed to this result, quite as much as his professional skill. In 1686, the Princess Anne of Denmark made him her physician. After the Revolution, he was sent for by King William, who frequently had recourse to his advice, and the example of the sovereign was followed by most of the nobility and influential persons about the court. Dr R., however, was himself no courtier; he had no occasion to become one. Dr Mead, who knew him well, pronounced of him, that he was 'deservedly at the head of his profession, on account of his great medical penetration and experience.' Blunt and independent in his manners—some indeed say even *brutal*, people nevertheless recognised under his rough exterior that quick perception and keen observation of symptoms which are so important in a master of the healing art; and thus his advice was asked by persons of all ranks, in return for which he received fees of an unprecedented amount.

In 1694, he was called upon to attend Queen Mary, when attacked by the small-pox. It proved to be her last illness, as Dr R. predicted, even before seeing her—merely upon reading the prescriptions

of the other physicians in attendance before he was sent for. He did what he could, however, to save her, but in vain; and some attributed her death either to his want of skill or negligence. About this time he offended the Princess Anne, who, having sent for him on some occasion to St James's, had the mortification to hear that he swore all her Royal Highness's ailments were nothing else than 'the vapours.' This, combined with her knowledge of Dr R.'s too great fondness for the bottle, made her appoint Dr Gibbons as her physician in his place. Still, the king continued to employ him. On one occasion, he sent for him to the Netherlands to attend upon his favourite, the Earl of Albemarle, for which he received £1200 from the king, and £400 from the patient himself, besides a diamond ring. To the king himself, he frequently spoke with much honesty and plainness concerning his ailments; once, however, he took too great a liberty, for upon his Majesty shewing him his swollen ankles, and asking him what he thought of them, Dr R. replied: 'Why, truly, I would not have your Majesty's two legs for your three kingdoms.' This was towards the end of 1699. He was not again consulted by that sovereign, who soon afterwards died; nor was he ever again completely reinstated in the good graces of Queen Anne, although she occasionally consulted him, and rewarded him handsomely for his services.

In 1713, he was elected M.P. for Buckingham. He had a country-house at Carshalton, to which he used occasionally to retire; and here he was living in 1714, when Queen Anne was attacked with what proved to be her last illness. Dr R. was summoned to attend her; but he either would not or could not come. He had taken physic, he said, and it was impossible for him to attend. The queen died in August; and the populace were so enraged against Dr R., that he dared not again shew his face in London. This much chagrined him, as it kept him a prisoner in a country village. His own end, however, was fast approaching. He must have been really ill when sent for to the queen, as he himself survived her for only two or three months. Dr R. died of gout at Carshalton on the 1st November 1714, and was buried at Oxford in St Mary's Church with much ceremony. He died possessed of considerable property, the whole of which he bequeathed to public uses. Thus, to University College he left his estate in Yorkshire, in trust, for the endowment of two travelling fellowships, and the purchase of perpetual advowsons, together with £5000 for the enlargement of the college buildings. He left £40,000 for the erection of a public library in Oxford, since known as the Radcliffe Library (q.v.), which he endowed with £150 per annum for a librarian, and £100 per annum for the purchase of books. To St Bartholomew's Hospital, London, he bequeathed the yearly sum of £500 towards mending the diet, and £100 per annum for the purchase of linen. The rest of his property he gave to his executors in trust for such charitable purposes as they might best approve. The Radcliffe Infirmary and Radcliffe Observatory, at Oxford, were both erected out of this fund; and from the same source, in 1823, the Radcliffe Trustees contributed the sum of £2000 towards the erection of the College of Physicians in Pall Mall.

RADCLIFFE, Ann, the most popular English novelist at the close of the last century, was born in London, July 9, 1764. She was of respectable parents named Ward. In her 23d year, she married Mr William Radcliffe, a student of law, but who became proprietor and editor of a weekly newspaper, the *English Chronicle*. Mrs R. lived much in retirement, known only to a few friends by whom she was warmly esteemed. Her works are—*The Castles of Athlin and Dunbayne* (1789), *A Sicilian Romance* (1790), *The Romance of the Forest* (1791), *The Mysteries of Udolpho* (1794), *A Journey through Holland*, &c. (1794), and *The Italian* (1797). Mrs R.'s popularity was constantly increasing down to the date of her latest work, when, in her 33d year, 'like an actress in full possession of her applauded powers,' as Scott has remarked, 'she chose to retreat from the stage in the full blaze of her fame.' She lived 26 years afterwards, dying in 1823. For the copyright of her *Mysteries of Udolpho*, her best work, she received £500; and for that of *The Italian*, £800. These sums were at the time considered excessive, and were perhaps the largest ever given in this country for works of fiction until the great era of the Waverley Novels. A sixth romance, entitled *Gaston de Blondeville*, and a collection of *Poems* by Mrs R., were published after her death.

As a novelist, Mrs R., is pre-eminent for vivid poetical imagination, and for great power of romantic narrative and description. Her paintings of external nature, and of scenes of feudal pomp, gloom, terror, or mystery, are quite unrivalled in modern romance. In the art of awakening curiosity and enchaining attention, she is no less skilful. She keeps her readers in a state of breathless awe and suspense; but in the end, when she resolves all the seemingly supernatural agencies and horrors of her tales into simple natural causes, she unquestionably fails, for her explanations are inadequate to account for the effects produced. She has also little variety of character or striking individual portraits, and no wit or humour. Hence her works, with all their gorgeous pictures and potent spells, seldom interest beyond the period of youth.

RADCLIFFE LIBRARY, Oxford. This institution, founded by Dr John Radcliffe (q. v.), stands in the central area of Radcliffe Square. The building is in the form of a rotunda, standing upon arcades, from the centre of which rises a spacious and well-proportioned dome. This dome is 84 feet in height from the pavement, and is beautifully wrought in stucco. The architect was James Gibbs, who commenced the building in 1737, and completed it in 1747. The library is approached by a handsome stone staircase, and over the entrance-door hangs the portrait of the founder by Sir G. Kneller. The books composing the library are for the most part works on natural history, physical science, and medicine. Besides these, Gibbs, the architect, bequeathed to it a collection of works, chiefly architectural; Wise, the first librarian, a collection of coins; Kennicott, a theological collection; Frewen, a miscellaneous library; Viner, some law-books; while from the Frazer and Sale collections, the trustees purchased 355 Oriental MSS. in the years 1758 and 1760. In 1856, the number of volumes comprising the scientific and medical collection was estimated by Dr Acland, the librarian, as not less than 14,000, and not more than 15,000. From the year 1834 to the year 1840, the trustees expended £500 annually on the purchase of books. The grant, however, was reduced to £200 in 1841, and continued at that low figure until 1863, when it was again raised to the sum of £500. In 1861, by an agreement between the Radcliffe Trustees and the university, the scientific books of the Radcliffe Library were removed to the University Museum, then recently erected, for public use under prescribed regulations, and the spacious room in the Radcliffe Library was opened as a reading-room in connection with the Bodleian Library. This reading-room is now open daily until 10 o'clock at night, to the great comfort and convenience of numerous readers.

RADEGUNDA, St, daughter of Berthar, a prince of Thuringia, in the earlier part of the 6th century. Having been carried as a prisoner to France in the twelfth year of her age by Clotaire, at that time king of the district whose capital is now called Soissons, she was educated in the Christian religion, and when she reached a maturer age, was induced, very reluctantly, to become the wife of Clotaire. Her own wish having been to become a nun, her married life was in great measure given up to works of charity and religion, and Clotaire complained that he 'had married a nun rather than a queen.' Eventually, about the year 553, she obtained his leave to retire to a monastery at Noyon, where she was consecrated a deaconess by the bishop Medard. Soon afterwards, she founded a monastery at Poitiers, in which she lived as a simple sister, but which she endowed richly, not only with money and lands, but also with relics and other sacred objects obtained from the Holy Land and all the more eminent churches of the East and West. It was on the occasion of the translation to her church at Poitiers of a relic of the holy cross that the Christian poet Vexantius Fortunatus composed the celebrated and truly magnificent Latin hymn *Vexilla Regis Prodeunt*. R. outlived him by more than a quarter of a century, during which she was regarded as a model of Christian virtue; and her life has formed the subject of many beautiful legends, still popular in Germany and France. Her monastery, before her death, which took place in 587, numbered no fewer than 200 nuns. Her feast is held on August 13, the anniversary of her death.

RADETSKY, Johann Joseph Wenzel, Count of Radetz, and an Austrian field-marshal, was born at Tzrebnitz, in Bohemia, in November 1766; and in 1784, entered the Austrian military service as a cadet in a Hungarian cavalry regiment, making his first campaign against the Turks in 1788—1789. He took part in the Austrian wars with Napoleon, brilliantly distinguished himself, and rose to the rank of lieutenant field-marshal. After the conclusion of peace, he was stationed mostly in Hungary; but the threatening aspect of affairs in Italy caused him to be sent to take the command of the Austrian army in Lombardy; hostilities were, however, deferred, and R. seized this opportunity of putting Verona in a complete state of defence. The Emperor Ferdinand, on his accession in 1836, acknowledged R.'s numerous and valuable services by raising him to the rank of field-marshal. The rebellion at last broke out suddenly in 1848, and R. was forced to retire from Milan and continue his retreat to Verona (April 2). His departure was the signal for a general insurrection, only the renowned Quadrilateral (q. v.) and the citadel of Ferrara remaining in the hands of the Austrians; and the revolt of Venice cut off all R.'s communications except that to the Tyrol. The Piedmontese army had now effected the passage of the Mincio (May 7), and closely invested Peschiera, thus rendering R.'s position an extremely critical one. He had only 50,000 men to oppose to the Piedmontese army of 41,000 men around Peschiera, a corps of observation 6000 strong near Mantua, a body of 4000 guarding the passage of the Mincio, the Roman army of 14,000 men holding the south bank of the Po, and an army of Venetian insurgents, numbering 15,060, in his rear. Being thus unable to take the offensive, he waited anxiously for the reinforcements which he expected by the Illyrian frontier, and which, after defeating the Venetian and Roman armies which attempted to stop their progress, joined him at Verona on May 22. The Austrians now assumed the offensive, and marched on Mantua, defeating the Italians in two bloody conflicts at Montanara and Curtatone, but were in turn signally vanquished at Goito by Charles Albert, who gained by this victory the immediate surrender of Peschiera (May 29), and rendered R.'s position more critical than ever. But the gallant Sardinian was no match for R. in generalship, for he wasted his time before Mantua, till R. had raised an army of 82,000 men, with which he drove the king (July 22 and 23) back, defeated him at Custozza (July 25), pursued him closely, converted his retreat into a disorderly flight, and again defeated him under the walls of Milan (August 4). The king was now besieged in Milan, but (August 6) a six months' armistice was agreed to, and war was not resumed by the Piedmontese till March 1849. R. was this time better prepared, and at once invaded Piedmont; after a successful brush with the enemy at Vigevano (March 21), he totally routed them at Novara (March 23), after an obstinate conflict of six hours' duration. Peace was now concluded with Piedmont, and R. next besieged Venice, which surrendered after a long siege (August 23). He was then appointed governor-general of Lombardy and Venice, and ruled with absolute authority till his retirement on February 28, 1857, suppressing all insurrections and disturbances with the utmost rigour. He died at Milan, January 5, 1858, at the age of 91 years. He bore the character of a brave soldier and consummate tactician, and, strange to say, acquired all his European reputation after he had passed his 80th year.

RADIA'TA, the lowest of Cuvier's four great divisions of the animal kingdom, derive their name from the organs of sense and motion being disposed as rays round a centre; the other three, in ascending order, being the *Articulata*, the *Mollusca*, and the *Vertebrata*. Before Cuvier's time, all invertebrate animals were divided into *Worms* and *Insects*. In 1795, he presented a Memoir to the Natural History Society of Paris, in which, to use his own words, he 'marked the characters and limits of the molluscs, crustaceans, insects, worms, echinoderms, and zoophytes;' and in a Memoir read before the Institute in July 1812, he 'distributed these various classes under three grand divisions, each of which is comparable to that of the vertebrate animals.' The necessity for the dismemberment and re-arrangement of this heterogeneous assemblage which Cuvier grouped together in his Radiata, has long been felt; and at the present day, 'the radiate mob' (as Professor Huxley terms it) may be regarded as effectually demolished. To shew how these animals have been re-arranged, it is necessary first to mention that Cuvier himself divided them into five classes—namely, (1) the *Echinodermata*, (2) the *Entozoa* (or Intestinal Worms), (3) the *Acalephæ* (or Sea-nettles), (4) the *Polypi*, and (5) the *Infusoria*. The *Echinodermata* are now included by Huxley (*Elements of Comparative Anatomy*, 1864) in the *Annuloida* (one of the eight primary groups into which he divides the whole animal kingdom); while J. Victor Carus (*Handbuch der Zoologie*, 1863) makes them an independent group. The Entozoa are placed by Huxley under the *Annuloida*, and by Carus under the *Vermes*. The Acalephæ are by unanimous consent placed in the *Cœlenterata*, a primary group established by Frey and Leuckart. Of the Polypi, those with ciliated arms (the Bryozoa or Polyzoa, of which the Sea-mat or Flustra is a well-known example) are now placed among the lower molluscs, which, under the term *Molluscoida*, are considered by Huxley as one of the eight primary groups; while the remainder are placed amongst the *Cœlenterata*. The Infusoria are now regarded by most zoologists as a class of the

Protozoa (q. v.), a primary group established by Siebold.

RADIATION OF HEAT. See HEAT.

RADICAL (Lat. *radicalis*, fundamental, from *radix*, root), originally *radical reformer*, a name applied to one of the political party which advocates extreme changes of a democratic character in the state.

RADIOLITES, a genus of lamellibranchiate mollusca, found only in Cretaceous rocks, and remarkable for the great diversity of its valves. The upper valve is flat or conical, with a central umbo; and the lower is an elongated cone, and has on its inner surface two large dental sockets, and lateral muscular impressions. The upper valve is not perforated with canals, as in the nearly related genus Hippurites. More than forty species have been described.

RADISH (*Raphănus*), a genus of plants, of the natural order *Cruciferæ*, having a spongy Silique (q. v.), which does not split open when ripe, ends in a conical or awl-shaped beak, and is more or less divided into transverse cells, in some species adhering together even in decay, and in some falling asunder. The flowers are yellow, red, or purple.—The COMMON R. (*R. sativus*) has thick, round, tapering, and pointed pods, little longer than their stalks, very slightly contracted, and not falling to pieces. It is an annual, with branching stem from two to four feet high, rough lyre-shaped leaves, and pale violet-coloured flowers with dark veins. It is a native of Asia, from the coasts of the Mediterranean to Japan, and has been cultivated in China, India, and Europe from the most ancient times, for the sake of its fleshy roots, which have a sharp biting taste, and are much used when young as a salad, and also to some extent as a boiled vegetable. In this latter way, the young and tender leaves were also formerly used. The varieties of R. in cultivation are extremely numerous; but they are generally classed under the two heads of *Long-rooted* and *Turnip-rooted* Radishes, the roots of the former resembling the carrot in shape, and the latter the turnip. The varieties differ very much, not only in form of root, but in colour and size, a red colour generally prevailing. Some of the darker-coloured turnip-rooted radishes attain the size of a man's head. Radishes are sown at different seasons, and are generally used when young and small; but some kinds are occasionally stored for winter. The root of the R. possesses demulcent, stimulant, and diuretic properties, and is sometimes used in cases of atony, or of excessive secretion of mucus by the organs of digestion or the urinary organs. R. juice, mixed with sugar-candy, is a popular and useful German remedy for hoarseness and cough.—Distinct from both the varieties above-named is the OIL R., which has a slender—scarcely fleshy—root, a short much-branched stem, and many-seeded pods. It is cultivated in China for the oil of its seeds.—Another species of R. (*R. caudatus*), a native of Japan, is there cultivated as an esculent.—To this genus belongs the JOINTED CHARLOCK of our corn fields (*R. raphanistrum*), which has found its way from Europe to North America, and is a troublesome weed there also. The seeds, however, may be advantageously crushed for oil.—The SEA R. (*R. maritimus*) is a more rare British species, the roots of which are of fine quality and great pungency.

RA'DIUS, in Geometry, is a straight line drawn from the centre to the circumference of a circle. See CIRCLE and QUADRATURE. In Trigonometry, the radius is taken as unity, and the sines, cosines, &c. are expressed in terms of it. In Astronomy, the same term is employed in a slightly different sense; and to prevent confusion, it is changed into *radius-vector*. The radius-vector is a straight line drawn from the centre of force to the position of a body which describes its orbit round that centre; if the orbit is a circle, the radius-vector is invariable in its length, but constantly changes if the orbit be any of the other conic sections. From astronomy the term has been transferred to what are called *polar equations* in the higher mathematics. To express a curve by this method a point is taken for the *pole*; through this point a line, the *axis*, is drawn, indefinite in length and arbitrary in direction; then as one end of the radius-vector is at the pole, its inclination to the axis, and its length at this inclination, will give a point in the curve. Equations to curves, when thus expressed in terms of the radius-vector, and its inclination to the axis, are called *polar co-ordinates*, and are generally much simpler in form than when expressed by rectangular *Co-ordinates* (q. v.).

RA'DNOR, NEW, a municipal and parliamentary borough in Radnorshire, of which it was formerly the capital, stands in the midst of exceedingly wild and hilly scenery, on the south border of Radnor Forest, and eight miles west-south-west of Presteign. In the immediate vicinity is the cascade of *Water-break-its-neck*, which descends from a height of 70 feet, and is one of the most celebrated in Wales. New R., once comparatively important, has dwindled into a small country town, remarkable only for the beauty of the surrounding scenery. In 1864, a statue in memory of Sir George Cornewall Lewis was erected at New Radnor. Pop. (of parliamentary borough) 2262. The business of the county is transacted at Presteign, the county town, which contains 1743 inhabitants.

RADNORSHIRE, an inland county of South Wales, bounded on the N. by Montgomeryshire and Shropshire, and on the S. and S.-E. by Brecknockshire and Herefordshire. Area, 272,128 acres; pop. (1861), 25,382. Groups of mountains, seldom forming themselves into continuous chains, cover the greater part of the surface of the county. Radnor Forest, which attains the height of 2163 feet, runs east and west, and is the loftiest and most connected of the ranges. The south-eastern district is flat, with a gradual slope towards the east. Of the rivers, the chief of which flow southward, the principal is the Wye (which forms the greater part of the southern boundary of the county), and its tributaries the Ithon, the Elan, and the Lugg. The county formerly comprised large tracts of bog and moorland, which are in course of being gradually reclaimed and cultivated. Its valleys, especially that watered by the Lugg, are famed for the richness of their pastures, which feed splendid herds of 'Herefords.' In the east and south-east districts of R. excellent wheat, barley, oats, and potatoes are grown. Sheep-farming, however, is the most profitable; on the pastures and common or waste lands, large flocks are supported, and in the more sheltered quarters, cattle are reared. The county returns one member to the House of Commons.

RA'DOM, a government of the kingdom of Poland (q. v.), extends immediately south-east of the government of Warsaw. Area, 9525 sq. m.; pop., 932,603. The surface, partly traversed by the Sandomir Mountains, which rise in the Katherinenberge to the height of upwards of 2000 feet, is the most elevated of the kingdom. The principal rivers are the Pilica and the Vistula, both of which flow north. The soil is diversified.

RADOM, capital of the government of the same

name, stands on the Radomka, 60 miles south of Warsaw. It has considerably improved in size within late years, and is the seat of an active trade and commerce. Pop. 10,231.

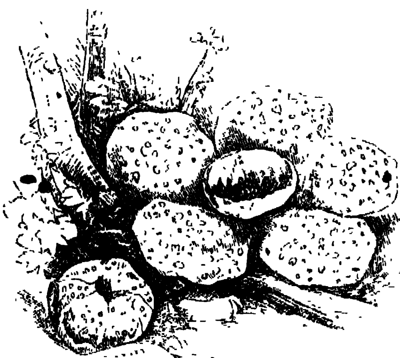
RADOWITZ, JOSEPH VON, Prussian general and statesman, born February 6, 1797, at Blankenburg, was the son of a nobleman of Hungarian descent, received his professional education at Paris, and in the Military School of the kingdom of Westphalia, which he left in 1813, in order to enter the Westphalian army as an officer. After the peace in 1815, he received an appointment as Master of Mathematical and Military Sciences in the Military School of Cassel; but in 1823, he entered the Prussian service, and in 1830, became chief of the general staff of artillery. By his marriage with the Countess Maria v. Voss (1828), he became connected with the Prussian aristocracy, and soon became the leader of the anti-revolutionary party. In 1836, R. was sent as Prussian military commissioner plenipotentiary to the German Diet at Frankfurt. In 1842, he was named ambassador extraordinary and minister plenipotentiary at the courts of Carlsruhe, Darmstadt, and Nassau; and in 1845, he was raised to the rank of major-general. Meanwhile his influence on public affairs in Germany became more and more conspicuous; above all, he was the confidant and adviser of King Frederick-William IV. in his endeavours to bring about a reform of the German Diet, as his pamphlet, Germany and Frederick-William IV. (*Deutschland und Friedrich Wilhelm IV.*, Hamb. 1848), proves. His Conversations about State and Church, suggested by the present state of affairs (*Gespräche aus der Gegenwart über Staat und Kirche*, Stuttg. 1846) may be taken as a manifestation of the intentions which tried to find a practical issue in the constitution of February 3, 1847. When the revolution of 1848 broke out, a new field opened itself for Radowitz. The endeavours of Prussia to give a constitution to Germany, by means of the alliance of the three kings, was principally his work. He now obtained the leadership of the affairs of the union in the Prussian chambers as well as in the parliament, which assembled (March 1850) at Erfurt, but was unable to prevent the failure of the union scheme. On September 27, 1850, he became formally Secretary for Foreign Affairs, but in 1851 retired to Erfurt, where he wrote his *Neue Gespräche aus der Gegenwart* (2 vols., Erf. and Leip. 1851). He died December 25, 1853.—Consult Frensdorff, *Joseph v. R. A.* (Leip. 1850).

RAEBURN, SIR HENRY, R. A., a distinguished portrait-painter, was born on March 4, 1756, at Stockbridge, then a village near Edinburgh, where his father was a manufacturer. His parents died when he was little more than six years old, and he was educated in that well-known institution, George Heriot's Hospital. He was apprenticed to a goldsmith and jeweller when about fifteen years of age; but having a very decided taste for art, he practised miniature-painting during his leisure hours with such success, that he was soon enabled to buy up his indenture, and devote himself first to miniature, and not long after to portrait-painting in oil. He married when he was twenty-two, and acquired some fortune by his wife. Proceeding to London, with introductions to Sir Joshua Reynolds, he was kindly received by him, and practised in his studio for about two months. Sir Joshua very soon perceived the high talent evinced by the young artist; advised him to visit Rome, and offered him funds for the purpose. Acting on this advice—he had funds sufficient—R. set out, furnished with letters from Reynolds to Pompeo, Battone, and other artists of note in Rome at the time. After remaining two years in Italy, he returned, and settled in Edinburgh in 1787, where he soon received full employment as a portrait-painter. In 1812, R. was elected President of the Society of Artists in Edinburgh; in 1814, Associate of the Royal Academy of London, and in the following year, Academician. He was knighted in 1822, when George IV. visited Scotland, and shortly after was appointed King's Limner for Scotland. He died at Edinburgh on 8th July 1823. R.'s style was modelled in a great degree on that of Reynolds—he aimed, like him, in his pictures to produce breadth—which is the effect obtained by massing together and keeping as far as possible the lights distinct from the shadows, and making them respectively effective, in place of dividing and mixing them up all over the picture; but he carried out this principle in a manner and with a feeling peculiarly his own. He never attempted, by thick impasto and semi-transparent painting, to produce texture and luminous effect, but adopted the opposite mode of painting in a low tone with a sharp touch, working his colours with little admixture of any unctuous medium. In his portraits of men, in particular, he gives the characteristic expression in a simple but decided and effective manner. His style has been thought by connoisseurs to resemble in many respects that of Velasquez. R.'s reputation was very high in his lifetime, and it is still rising, his pictures being now much sought after. Among the notable personages who sat to R. for their portraits were Sir David Baird, Sir Walter Scott, Henry Mackenzie, Neil Gow, Harry Erskine, Dugald Stewart, Professor Playfair, Dr George Hill, Francis Jeffrey, Henry Cockburn, and many of the Scottish nobility.

RAFFLES, SIR THOMAS STAMFORD, a distinguished traveller and naturalist, was the son of a captain in the West India trade, and was born at sea, off Port Morant in Jamaica, on the 5th of July 1781. His first appointment was to a clerkship in the East India House. Having attracted the notice of his superiors by his talents and industry, he received a permanent appointment in the office. In 1805, the Court of Directors determined on sending out an establishment to Penang or Prince of Wales' Island, and young R. was appointed assistant-secretary. He arrived at Penang in September of the same year; and having studied the Malay language with great diligence during the voyage, he was enabled to enter upon his duties with efficiency on his arrival. He continued his study of the Malay and other eastern languages, in which he made considerable progress. Eventually, R. was made principal secretary. In 1808, he made a voyage to Malacca, where he had the opportunity of mixing with Javanese, Amboynians, Borneans, Papuans, Cochin-Chinese, and Chinese Proper. With respect to Malacca itself, he collected much interesting information. In 1811, when it was resolved by the English government to take possession of Java, then belonging to the Dutch, it was arranged that Mr R. should accompany the expedition as secretary to the governor-general, Lord Minto, who was himself to take the chief command. After some hard fighting, the troops took possession of the island. Mr R. received the appointment of lieutenant-governor of Java and its dependencies; and upon the departure of Lord Minto, took upon himself the entire administration of the newly-acquired territory. Much had still to be done in the way of conciliating the native princes and chiefs to the British rule. He had to appoint British residents at several of the native courts, and to frame rules

and regulations for their conduct. He ordered a general survey to be made of the whole island, the reading of which, as well as of all the reports connected with that and other things, occupied a considerable part of his time. By frequent personal interviews with the natives also, he sought to become acquainted with their manners and character, and to make such regulations as would be for their best interests both morally and materially. While engaged in this career of usefulness, his health gave way; and in 1816 he returned to England, stopping by the way at St Helena, where he had an interview with Napoleon. On his arrival in England, he wrote his well-known *History of Java*, published in two volumes 4to in 1817, in which year he received the honour of knighthood. Java having by this time been restored to the Dutch, Sir Stamford R. was appointed lieutenant-governor of Bencoolen, a settlement upon the coast of Sumatra, where he landed in March 1818. In the latter part of that year he was called to Calcutta, on a visit of business, and instead of returning directly to Bencoolen, was sent to form a new settlement at Singapore. Here he remained for some months, and then again returned to Bencoolen, where he continued to discharge the duties of lieutenant-governor until February 1824, when he was compelled by ill-health to return to England. The vessel in which he set sail took fire, the crew and passengers escaping with difficulty in the boats. By this accident, Sir Stamford R. lost the greatest part of his effects, including a fine collection of natural history, and other things, valued at about £20,000. After his arrival in England, he lived to carry out what had been one of his favourite projects—namely, the formation of the Zoological Society of London, of which he was named President, and to the interests of which he devoted himself to the time of his death. This took place on the 5th of July 1826.

RAFFLE'SIA, a remarkable genus of plants belonging to the small natural order *Rafflesiaceæ*, an order composed entirely of parasitic plants,



Rafflesia Arnoldi.

which consist merely of a flower, and form part of the *Rhizogens* (q. v.) of Lindley. The *Rafflesiaceæ* are natives partly of the Indian islands and partly of South America. The plants of the genus *Rafflesia* have neither stalk nor leaves, but are mere flowers seated upon the roots of species of *Cissus*, making their appearance at first as a hemispherical swelling of the bark of the root, and, after the bark has broken, rising up in the form of a head of cabbage, whilst the perianth is covered with imbricated bracteæ, which are more or less recurved after it has opened. The perianth is thick, fleshy, and 5-partite. The germen is inferior, and contains many ovules; and the anthers, which are numerous, are seated under the revolute margin of the top of the style column. After the flower has expanded, it diffuses a carrion-like smell, that even attracts flies, and induces them to deposit their eggs. The largest and first-discovered species, *R. Arnoldi*, was discovered in 1818 in Sumatra by Dr Arnold, and was sent to the eminent botanist, Robert Brown, by Sir Thomas Stamford Raffles, the British governor in Sumatra. Its flower measures fully three feet in diameter, is capable of containing almost two gallons of fluid, sometimes weighs ten pounds, and is the largest of all known flowers. A smaller species, *R. patma*, whose flowers are 16 inches—2 feet in diameter, is highly prized by the Javanese as a medicine, for its strong styptic powers. *R. Horsfieldii*, another Javanese species, is still smaller, its flowers being only three inches broad.

RAFN, Karl Christian, a celebrated Danish critic and archæologist, was born at Brahesborg, in the island of Fünen, January 16, 1796, and educated at the university of Copenhagen, of which he was appointed sub-librarian in 1821. Even while a boy at the gymnasium of Odense, he was distinguished by his fondness for the old Norse literature and language, and when he became officially connected with the university, he undertook a general revision of all the Icelandic and Old Norse MSS. preserved there. It is to R.'s unwearied exertions that Denmark owes the foundation (1825) of the 'Society for Northern Antiquities,' whose principal object is the publication and criticism of all documents that can throw light on the subject of Old Norse literature. To this single end, R. has devoted his whole life. As secretary of the 'Society,' he has edited and published a great many ancient Scandinavian MSS., occupying about seventy volumes. Among his numerous important works, we may mention a Danish translation of Norse Mythic and Romantic Sagas (3 vols., 2d ed. 1829—1830); an edition (from a manuscript), with philologico-critical remarks, of Ragnar Lodbrog's death-song, under the title of *Krákumál, seu Epicedium Ragnaris Lodbroci, Regis Daniæ* (Copenh. 1826); a complete collection of the Norse sagas (many of these MSS. being hitherto unedited) entitled *Fornaldar-Sögur Nordlanda* (Copenh. 3 vols., 1829—1830); and the *Færeyinga-Saga* (1832) in Icelandic, with translations in Danish and Faroese, and critical apparatus. But his most widely-known and perhaps his most interesting work, is his *Antiquitates Americanæ, seu Scriptores Septentrionales Rerum Ante-Columbianarum in America* (Copenh. 1837), in which, from a critical examination of numerous geographical, nautical, and astronomical data in certain Old Norse MSS., he comes to the conclusion that America was discovered by Norsemen in the 10th c., 400 years before Columbus was born; and that, from the 11th to the 14th century, a large tract of the North American coast had been visited and even partially colonised as far south as Rhode Island and Massachusetts—a conclusion, it may be added, the probability of which has been confirmed in several important points by recent topographico-antiquarian researches in these states. The subject was followed up by him and Finn Magnussen in their *Historical Monuments of Greenland* (3 vols., Copenh. 1838—1845). Another very important work to which R. has furnished a great part of the text, carefully worked up from MSS., and a Danish translation of the first three and the 11th books in parallel columns, is the great collection of historical sagas representing events that took place out of Iceland, and entitled *Fornmanna Sögur* (12 vols.,

Copen. 1828, et seq.). He has also had a great share in drawing up and editing the Icelandic MSS. relating to the history of Russia and other eastern countries, and of which two volumes appeared at Copenhagen in 1850—1852, under the title of *Antiquités Russes.*

RAFTERS, the sloping timbers of a Roof (q. v.) which meet in an angle at the ridge, and on which rest the laths or boarding which carry the tiles or slates.

RAGGED SCHOOLS. The Ragged School, as distinct from the Certified Industrial School, is a voluntary agency providing education for destitute children, and so preventing them from falling into vagrancy and crime. Vagrant children, and those guilty of slight offences, are provided for in the Certified Industrial School; but the two institutions are frequently combined. See article INDUSTRIAL SCHOOLS. The movement which established ragged schools was almost simultaneous with that which instituted reformatories. John Pounds, a poor shoemaker at Portsmouth, has the honour of originating the idea. For twenty years, up to the time of his death in 1839, he gathered the ragged children of the district round him as he sat at work. They came freely, and were taught gratuitously. Sheriff Watson of Aberdeen has the merit of making the idea a national one, and thus originating the movement. His offer of education was accompanied with the offer of food—a necessity for the wretched children who picked up a living in the streets. The first school was opened in Aberdeen in 1841, and from thence ragged feeding schools spread over all the country. London had a Ragged Sunday School in 1838, which eventually became a free day-school. Field Lane followed in 1843. The Ragged School Union of London now numbers 201 day-schools, with 17,983 scholars (of these, 2849 are industrial); 180 Sunday schools, with 23,360 scholars; and 205 night-schools, with 8325 scholars. The number of schools throughout the country cannot be ascertained, as they are not officially known. A Privy-council Minute of 1856 allowed a capitation grant of £2, 10s. to every child fed in the schools. This was withdrawn in 1859, as was also the grant of one-third the cost of material used in industrial training. Many of the existing schools certified under the Act of 1857, as in Scotland under Mr Dunlop's Act of 1854, but these acts operated very slightly in changing the character of the schools, though introducing the principle of compulsory detention, more fully worked out under recent acts. In the present code of government education, ragged schools are left out. They can obtain grants on the same conditions as other schools, conditions to them often difficult and unnecessary. For industrial teaching, they receive nothing. The ragged school joined to the certified industrial is precluded from any aid from any quarter. No school can be helped by the Committee of Council which is receiving Treasury help, and the Treasury only pays a weekly sum towards the maintenance of each sentenced child. There are still, it is estimated, 25,000 ragged children in the streets of London.

RAGGEE (*Eleusine corocana*), an Indian grain (see ELEUSINE), very prolific, but perhaps the least nutritious of the cereals, although it is the chief food of the poorer classes in Mysore and on the Neilgherries. It is made into dark-brown cakes and porridge, which are described as very poor fare.

RAGHU is, in the legendary history of ancient India, the name of a celebrated king of Ayodhyâ. See OUDE. He belonged to the royal dynasty which derived its origin from the sun; and amongst his descendants is Râma (q. v.). See also the next article.

RAGHUVANS'A (from *Raghu* [q. v.] and *vans'a*, race or family, hence 'the family of Raghu') is the title of one of the most celebrated poems of Sanscrit literature, attributed to the authorship of Kâlidâsa (q. v.). It consists of 19 sargas—i. e., sections or cantos—and its subject-matter is the legendary history of the kings of the solar race, beginning with that of Dilîpa, the father of Raghu, and ending with that of Agnivarn'a. The text of the poem, with an excellent Latin translation of it, was published by Professor A. F. Stenzler (London, 1832); the text, with a prose interpretation in Sanscrit, by Pandits of the Sanscrit College of Calcutta (1831); and the text, with the complete and important commentary of Mallinâtha, by Giris'achandra Vidyâratna, one of the professors of the government Sanscrit College (Calcutta, 1852). Single cantos with the same commentary have also been published at Bombay and Madras.

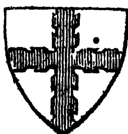
RAGLAN, LORD, FITZROY JAMES HENRY SOMERSET, Field-marshal, G.C.B., eighth son of the fifth Duke of Beaufort, was born September 30, 1788. He entered the army in his 16th year, and in 1807, served on the staff of the Duke of Wellington in the expedition to Copenhagen. He went to the Peninsula as aide-de-camp to the Duke, and in 1812 became his military secretary. As Lord Fitzroy Somerset, his name became a household word. He was present at all the great actions of the Peninsular campaign which illustrate the career of the great commander. He was among the first to mount the breach at the storming of Badajoz, and it was to him that the governor gave up his sword. On the return of Napoleon from Elba, he served under the Duke in Flanders, and lost his sword-arm in the crowning victory of Waterloo. The very next day, he was seen practising writing with his left hand! For his brilliant military services, he was made K.C.B., and received orders from several foreign potentates. He was minister-plenipotentiary at Paris in 1815, and secretary to the French embassy from 1816 to 1819. The Duke was appointed in 1819 Master of the Ordnance, and R. again became his secretary. In 1822, he went to the Congress of Verona in attendance on the Duke, who was the English plenipotentiary. In 1827, the Duke was appointed commander-in-chief of the British army, and called R. to the Horse Guards as his military secretary. This office he held until the death of his chief in September 1852. He was then made Master-general of the Ordnance, and in October was called to the House of Peers as Baron Raglan of Raglan, in the county of Monmouth. He had previously sat in the Lower House during the parliaments of 1818 and 1826 for the borough of Truro. While Master-general of the Ordnance, he was appointed, with the rank of general while so employed, commander of the English forces which were despatched to Turkey in February 1854. The allied armies of Britain and France, under R. and Marshal St Arnaud respectively, made good their landing in the Crimea. The victory of the Alma, the flank-march to Balaklava (q. v.), the cavalry charge which has made that place immortal, the sanguinary and desperate infantry-battle of Inkermann (q. v.) (which obtained for R. the baton of Field-marshal), and the siege of Sebastopol, are too well-known to need description. Unfavourable comments began to be made, as the campaign proceeded, upon R.'s conduct of the war. During the winter, 1854—1855, his soldiers suffered unspeakable privations, and hundreds perished in camp and on board transports for want of the food, clothing, and medicines

which were in store, but could not be found in the confusion and mismanagement that prevailed. Supplies arrived; but the siege continued without much apparent success until June 18, when a general assault was ordered, and when R.'s troops, as well as the French, received a terrible repulse. R. had been suffering from a slight attack of cholera, and the disaster of June 18 weighing upon his mind, he suddenly became worse, and died of exhaustion, June 28, 1855. His remains were brought to England, and buried in the family cemetery at Badminton. R. was an indefatigable and experienced administrator. He proved himself to be a skilful tactician, although it may be doubted whether he had the qualities of a great general. He was undeniably gifted with many qualities that shone with great lustre in the field as well as in council. His demeanour in action was so calm that it excited the admiration of the French, and Marshal St Arnaud declared that his bravery rivalled that of antiquity. His courteous and noble bearing, his gentleness of temper and firmness of mind, and his constant worship of 'duty,' invest his character with something of the chivalrous. See Kinglake's *Invasion of the Crimea.*

RAGMAN ROLL (*ragman*, a word of uncertain origin, used in ancient diplomatic language for an indenture or legal deed), the name given to the collection of instruments which record the acts of fealty and homage performed by the Scottish nobility and gentry to Edward I. of England during his military progress through Scotland in 1296, and afterwards at the parliament held at Berwick. The original instruments of homage under the seals of the parties were deposited in the Royal Treasury of England, and have almost entirely perished; but the roll in existence in the Tower preserves a record of them. Its contents were given in an abridged form in Prynne's *Records*, and afterwards printed *in extenso* by the Bannatyne Club in 1834. An especial value attaches to the Ragman Roll as containing the largest and most authentic enumeration extant of the nobility, barons, landholders, and burgesses, as well as of the clergy of Scotland, prior to the 14th c., and the only genuine statistical notices of Scotland of the period.

RAGOÛT (Fr. *ragoûter*, to revive the appetite; appears to be from Lat. *re-ad-gustare*), a name much less in use now than formerly, for a dish of stewed meat and vegetables, usually flavoured with herbs and other condiments. It differs but little from the olla of the Spaniards and the pilau of the Turks.

RAGS. Fragments of nearly all textile materials have now a commercial value; those of cotton, linen, and hempen cloths are used in the manufacture of Paper (q. v.); and woollen and worsted rags are made available for respinning either alone or mixed with fresh wool, whilst the refuse is ground into powder, dyed various colours, and forms the material called flock, used by the paper-stainers to produce their ornamental flock-papers. The trade in rags is enormous. Linen and cotton rags to the extent of from 18,000 to 20,000 tons per annum are now imported by British paper-makers, and perhaps quite as large a quantity is collected at home. The imports are likely to increase speedily, as the Italian and French governments have recently (1864) lowered their export duties on this article. For woollen rags, see SHODDY.



Raguly.

RAGU'LY, in Heraldry, a term applied to an ordinary whose bounding lines are furnished with serrated projections.

RAGU'SA (Slav. *Dubrovnik*, Turk. *Paprovnik*), formerly an independent republic, now a decayed episcopal town and seaport of Austria, in the crown land of Dalmatia, lies at the base and on the steep slopes of Mount Sergio, 40 miles west-north-west of Cattaro. Its higher streets communicate with its lower by means of flights of steps. It is surrounded on the land side by double walls, surmounted by old towers. Immediately south of the town is a harbour, which admits only small vessels; but two miles west is Gravosa, the proper harbour of R., and which offers secure and spacious accommodation to the largest vessels. The trade of R., which was once extensive and profitable, has sunk, and its inhabitants, 5000 in number (about a sixth of the former population), support themselves by ship-building, and by the manufacture and export of soap, liqueurs, malmsey wine, silk, leather, and tobacco. R. also carries on a considerable transit trade with Turkey by means of the Turkish caravans, about 200 of which—in all about 7000 horses—visit the town annually.

R. is supposed to have been founded in 656 by refugees from Old Ragusa (the ancient *Epidaurus*, situated 10 miles south-east), which was at that time destroyed by a tribe of Slavonians. It formed itself, after the model of Venice, into an aristocratic republic, governed by a rector. In 1358, it placed itself under the protection of Hungary, and later it became tributary to the Porte. Napoleon, in 1808, abolished the republican government of R., and incorporated the town with the province of Dalmatia. After 1814, the town, together with the province, came into the possession of Austria.

RAGUSA, an old town in the south of Sicily, in the province of Syracuse, and 30 miles west-south-west of the city of that name, stands on a narrow and steep ridge between two ravines, on the right bank of the Ragusa, and about 15 miles from the sea. In the cliffs below the walls and around the town, ancient tombs of various shapes have been hollowed out. R. is supposed to occupy the side of the ancient *Hybla Minor.* Pop. 22,000, who manufacture woollen and silk goods.

RA'GWORT, the common English name of those species of *Senecio* (q. v.) in which the heads of flowers have a spreading ray, the involucre has small scales at the base, and the leaves are pinnatifid. The British species are large coarse weeds,



Common Ragwort (*Senecio Jacobæa*).

with erect stem, and yellow flowers; one species, the COMMON R. (*S. Jacobæa*), a perennial, is too plentiful in many pastures. It is refused or disliked by horses, oxen, and sheep. It generally disappears from thoroughly drained land, at least after a little labour has been expended in grubbing up its roots. The fresh herbage has been used to dye wool green, but the colour is not permanent.

RAG-STONE, an impure limestone, consisting chiefly of lime and silica, much used in Kent. It breaks up into pieces about the size of a brick, and is hard and flat bedded. The name is also applied to the hard irregular rock which frequently overlies better building materials. Besides being used for building purposes, hones or sharpening stones for scythes and other large blades are made of it.

RAHDUNPU'R, a large fortified town of Hindustan, in a protected state of the same name, in the north-west of Guzerat, about 150 miles north-west of Baroda. The majority of the inhabitants, who are chiefly Rajputs and Coolies, are engaged in agriculture; trade and manufactures, however, are carried on to some extent. Coarse cotton cloths—the staple manufacture—and grain, leather, and hides are exported. Pop. 15,000. The state of R., which is under British protection, has an area of 850 square miles, and a pop. of 45,000. The climate, very hot during October and November, is delightful from December to April.

RÂHU is, in Indian Mythology, the demon who is imagined to be the cause of the eclipses of sun and moon. When, in consequence of the churning of the milk-sea, the gods had obtained the Amr'ita, or beverage of immortality, they endeavoured to appropriate it to their exclusive use; and in this attempt they had also succeeded, after a long struggle with their rivals, the Daityas, or demons, when R., one of the latter, insinuating himself amongst the gods, obtained a portion of the Amr'ita. Being detected by the sun and moon, his head was cut off by Vishn'u; but the Amr'ita having reached his throat, his head had already become immortal; and out of revenge against sun and moon, it now pursues them with implacable hatred, seizing them at intervals, and thus causing their eclipses. Such is the substance of the legend as told in the *Mahâbhârata* (q. v.). In the *Purân'as* (q. v.), it is amplified by allowing both head and tail of the demon to ascend heaven, and produce the eclipses of sun and moon, when the head of the demon is called *Râhu*, and his tail *Ketu*, both, moreover, being represented in some *Purân'as* as the sons of the demon *Viprachitti* and his wife *Sinhikâ*. In the *Vishn'u-Purân'a*, R. is also spoken of as the king of the meteors.—In Hindu Astronomy, R. is personified as the moon's ascending, and Ketu as the moon's descending, node.

RA'HWAY, a city of New Jersey, U.S., on the Rahway River, 5 miles from its mouth, and the New Jersey Railway, 19 miles west of New York. It contains numerous manufacturing establishments, a large proportion of which are for carriages. Pop. (1860) 7130.

RAIKES, ROBERT. See SUNDAY SCHOOLS.

RAIL (*Rallus*), a genus of birds of the order *Grallæ*, and family *Rallidæ*, having a slender bill, longer than the head, the body of a very compressed form, wings of very moderate length, a very short tail, long and strong legs, and long toes. The only European species is the COMMON R. or WATER R. (*R. aquaticus*), sometimes called *Bilcock*, a bird which occurs in almost all parts of Britain, and is not unfrequent in marshy situations and the reedy margins of lakes and rivers, although it often eludes observation, threading its way among reeds—for which its compressed form seems specially adapted—and diving when compelled to betake itself to open water. It does not rise, except in extreme necessity; and when flushed, flies heavily. It is more plentiful in most parts of the continent than in Britain; and is there generally a bird of passage, breeding in the north, and migrating southwards on the approach of winter. It makes its nest of coarse grass and sedges among thick aquatic plants. The whole length of the bird is about eleven inches and a half. The sexes are very similar in plumage, olive-brown, marked with black above; bluish-ash colour beneath, with white transverse markings on the belly. The water R. feeds on worms, molluscs, and soft vegetable substances. It is in the highest esteem for the table.—America produces a number of species of R., as the VIRGINIAN R. (*R. Virginianus*), a species rather smaller than the Water R. of Europe, and much resembling it in its habits; a bird of passage, and in many parts of North America very abundant; the GREAT RED-BREASTED R., or FRESH-WATER MARSH HEN (*R. elegans*), a much larger bird, fully 20 inches in length, inhabiting the extensive marshes of the southern states of North America; the CLAPPER R., or SALT-WATER MARSH HEN (*R. crepitans*), extremely abundant in the salt-marshes of the same regions, its whole length about 15 inches; all of which are much esteemed for the table, the eggs of the Clapper R. being also collected in great numbers as a delicacy. The name Clapper R. is from the cackling cry which the bird seems to delight in emitting.—The MANGROVE HEN (*R. longirostris*) abounds on the muddy shores of the West Indies, and its flesh is held in the highest esteem.—In general form, and in the character of



Water Rail (*Rallus aquaticus*).

their plumage, all these and other species are very similar.

RAILS, in Architecture, are the horizontal bars in panelled stone or wood work, such as doors, shutters, &c., which enclose the panels, the upright pieces being termed styles.—The word is also applied to the level piece over balusters or between posts.

RAI'LWAYS. The origin of these now vast undertakings is traced to a contrivance for simplifying the transit of coal from the mines in Northumberland and Durham to the places of shipment on the Tyne and Wear. The invention consisted of a double parallel line of wooden beams or trams fixed to the ground, and furnished with flanges to prevent the wheels of vehicles from slipping aside. Along these flanged beams wagons were drawn by horses with such comparative ease, that instead of a load of 17 cwt. by a common road, a load of 42 cwt. could now be drawn by a

single horse. These new thoroughfares, called tramways, were made across fields, the proprietors of which received a certain rent for the way-leave or use made of them—which term, way-leave, is still employed in arrangements of this kind. To the coal districts of the north of England, therefore, is indisputably due the simple yet meritorious contrivance which, from less to more, led to the modern railway, with all its wonderful machinery; nor is it useless to note, that the invention, in its early stages, owed nothing to men of education or high scientific attainments, but was mainly the work of obscure mechanics and illiterate enthusiasts.

The date of the invention of tramways is uncertain, but by good authorities it is referred to the period between 1602 and 1649. From the northern coal districts it gradually came into use in other mining districts in England, as also in the south of Scotland. The 17th c. was not favourable to mechanical improvement. Not till about 1700 was there any marked advance on the original tramway. The first step was the clothing of the wooden beams with long slips of iron, to prevent excessive tear and wear. This also being found defective, a second and more complete improvement, about 1740, was the substitution of cast-iron rails fixed in parallel lines on cross wooden sleepers. This species of railway became pretty general in mining districts between 1745 and 1775. In the former of these years, one was in operation in Scotland—namely, a short coal-line from Tranent to Cockenzie, which General Cope selected as a position at the battle of Prestonpans. Though now considerably improved, railways did not attract attention as being suitable for general traffic. The success of canals not only turned the public mind in that direction, but raised up a powerful canal interest, which viewed the progress of railways with extreme jealousy and ill-will.

The use of cast-iron rails led to an improved method of traction. Instead of employing a single large wagon, the plan of linking together a series of smaller wagons was adopted—the germ of the modern train. The next improvement consisted in putting flanges on the wheels instead of the rails, by which great facility of transit was afforded. The draught still continued to be executed by horses; but as the railway system seemed to possess immense capabilities of expansion, many minds laboured in devising schemes to substitute steam-apparatus. The invention of the locomotive, like that of railways, was the work of successive geniuses. Watt had shewn the practicability of fixed steam-engines; what was now wanted was an engine that would travel by its own internal impulse. The merit of inventing a self-acting steam-carriage is allowed to be due to Richard Trevethick, a clever but eccentric engineer. In 1802, he took out a patent for a steam-carriage, and this novel machine he exhibited to large crowds of admiring spectators on a piece of ground near London. Immediately afterwards, he adapted his carriage for the drawing of wagons on railways, a duty which it successfully executed on the Merthyr-Tydvil Railway in 1804. This was the first locomotive; but it was far from perfect. It drew only 10 tons of bar-iron at the rate of five miles an hour. Trevethick did not remain in England to improve on his invention, nor did the moderate achievements of his machine immediately induce others to make any distinct advance on his ingenious contrivance. For this lethargy there were various causes; but the principal consisted in a universal belief among engineers, that the locomotive could not be expected to gain great speed, to ascend a moderate incline, or to draw a heavy load, unless the wheels were provided with a cogged rim to work on a corresponding rack along the rails. Numerous schemes were made the subject of patents to overcome this imaginary difficulty—a circumstance which gives one a poor opinion of the state of engineering knowledge at the beginning of the 19th century. That locomotives running with smooth wheels on smooth rails, by mere weight and friction, as exemplified by Trevethick, could draw heavy loads up a moderate incline, was at length, in 1811, established as a fact by Mr Blackett, a coal-proprietor, on the Wylam Railway. The means for imparting speed alone remained to be given.

Locomotive power was employed by George Stephenson (q. v.) on the Killingworth Railway in 1814, and with such success, that it was afterwards applied on the Stockton and Darlington Railway, for which the first act of parliament was passed in 1821. In this last undertaking, Stephenson was encouraged by the generous and enlightened aid of Edward Pease, a member of the Society of Friends, whose name will always be associated with the history of railway enterprise. The Stockton and Darlington was the first railway in which carriages travelled with passengers; yet, even with the measure of success so secured, the locomotive was still an imperfect machine, for its rate of progress continued to be little faster than the walk of a horse. Acceleration was now the grand desideratum, and it was attained by using a very simple contrivance—that of sending the waste steam up the chimney, so as to cause a powerful draught in the fire; a rapid generation of steam was the consequence, and by this appliance, along with the multitubular boiler, the machine shot forward with an energy hitherto unknown (see STEAM-ENGINE). Certain improvements in details only remained to be effected, and these were carried out at Stephenson's engine works at Newcastle; the greatest improvement of all consisted in that nice adjustment of parts, which is now observable in the mechanism of the locomotive.

It certainly seems very strange, that notwithstanding the proved feasibility of railways, the public at large could not be stimulated to give any heed to the subject. It was shewn in this, as in the analogous case of steam-boats, that the world may remain sceptical of an invention long after it has been practically established beyond cavil. The idea of extending railways over the kingdom for general traffic, was perhaps first conceived by Thomas Gray of Nottingham, who, full of enthusiasm, besieged the public, and memorialised the government on this his favourite project, between 1820 and 1824. A work, embodying his views, *Observations on a General Iron Railway, &c.*, was published in 1820. Gray's ardent notions met with little favour. Unfortunately, he was no mechanic, and, seemingly unacquainted with the advances which had been made, laboured under the old exploded belief, that locomotives must have cogged wheels. After Gray, there appeared another projector, William James of London, who, in 1822, endeavoured, without success, to establish a railway between Liverpool and Manchester. Opposition caused his plans to be laid aside. The next and more fortunate projector was Joseph Sanders of Liverpool. He issued the prospectus of a railway from Liverpool to Manchester, 29th October 1824; and this line, surveyed by Stephenson, was, after much unworthy opposition, and some changes of route, sanctioned by the legislature. It was formally opened for traffic, September 15, 1830. Provided with some of George Stephenson's improved locomotives, the success of the line was immediate and complete—in fact, the great railway system was inaugurated.

Now, properly speaking, began that course of commercial enterprise, unregulated, and often wasteful, which has since assumed such importance. Refraining from all control over railway operations, the government left speculators to carry lines anywhere or anyhow that parliament could be persuaded to sanction. The result, as is well known, has been in many places a complication of competing lines on no principle of economy or enlightened foresight. Abandoned, as it were, to the audacity of promoters, and the mere brute force of capital, schemes, good, bad, and indifferent, had to fight their way at a cost almost exceeding belief; while at the same time there has been much waste of money in allowing circuitous lines to places which are afterwards, in a great measure, superseded by others more direct.

Legislation and Management.—In the United Kingdom, railways are the property of independent companies, who construct and work them under the provisions of acts of parliament. The first step consists in organising a company. Generally, a solicitor and a few active projectors draw up a prospectus, call meetings, suggest the names of directors, and appoint an engineer to make a survey. In no case does government or any public body take any part in the initiatory proceedings, or find any part of the capital. In some instances, the land proprietors in the district to be traversed and benefited, are among the principal promoters, but for the greater part, the scheme is got up by individuals who can plead no such inducements. By the engineer and solicitor, there is much to be done at the outset. Having procured a copy of the survey, the solicitor has to discover the name of every proprietor whose land is interfered with, as well as every tenant or occupant; all which names, with the extent and nature of the land to be taken, are entered in a roll, called the *Book of Reference;* and with every person so concerned, a schedule must be lodged, stating all particulars. The recipients of the schedules are requested to state in reply, whether they design to assent, to oppose, or to remain neuter; by which means, the mind of every one territorially interested becomes known to the promoters. Land to be taken for, or damaged by, railways is valued under different categories: 1. The quantity and quality at so much per acre; 2. The injury caused by cutting off one part of a field from another, called intersectional or severance damages; and 3. damage done to the amenity or beauty of the place. Besides claiming compensation on these different grounds, the proprietor demands, for the sake of convenient communication, that bridges or level crossings shall be made across the line, or that passages be left beneath it; also that all ordinary means of drainage be maintained by culverts. Sometimes, he stipulates for a siding or station. Should the lands be let to a farmer, as is very generally the case, he is treated with separately for the loss he is likely to sustain during his lease, including any loss by unexhausted manure in the lands appropriated. Being thus compensated for his claims, the farmer continues to pay his rent as usual, without deduction, according to the obligations of his lease, and any question is saved between landlord and tenant. Such is an outline of the usual method of settling 'land-claims,' though much depends on the feeling on both sides. At one time, enormous sums were asked, and paid for alleged damage to land; now, the claims are more moderate, and in few instances is damage to amenity an element of consideration.

Until a statutory enactment is procured, the shares of a company are in that embryo state called *scrip.* Allotted to applicants by the provisional directors, the shares are 'taken up' by paying a small instalment of from 5s. to 20s. per share. These preliminary sums are paid in to a specified bank, the receipt of which is the scrip or certificate that so frequently becomes the subject of eager transfer among jobbers. The bank deposits of the allotters constitute the fund from which are paid—1. Expense of survey; 2. Expense of advertisements, prospectuses, &c.; 3. Parliamentary expenses; and 4. The amount to be lodged with an officer of government as a guarantee that parliament shall not be troubled with a merely pretended scheme. Should the bill not pass, the sum last mentioned is returned, and is, along with any residue, divided *pro rata* among the holders of scrip. Should the bill become law, scrip-holders are required to present their names with the amount of their respective shares for register at the office of the secretary of the company. 'Calls' are next made on the shareholders. If the shares be £10, a call of £2, 10s. per share, at intervals of three months till the whole is paid, is customary. Any failure to pay calls by a prescribed day incurs the risk of forfeiture. In authorising a company, parliament gives power to raise so much money by shares, and so much by borrowing. The amount that may be borrowed is equal to a third of the stock, but it cannot be legally borrowed until all the shares have been issued, and at least one-half of all the shares have been paid up. The lender has a mortgage over the whole property of the company, called a Debenture (q. v.). The entire amount paid for shares and borrowed on mortgage forms the 'capital account' of the company. See Capital Account, in which an explanation is offered of the manner of disbursing from capital and also from revenue; it being from revenue alone that dividends can be legally paid.

The act which authorises the undertaking constitutes the company a corporation, the members of which are responsible only to the extent of their respective shares. In the act, the names of the first directors are given; it is also stated who are first to retire, and how elections are to be conducted. A director must possess a prescribed amount of stock. The directors are empowered to appoint from their number a chairman and deputy-chairman. They likewise have the appointment of secretary, traffic-managers, and other paid officials. The directors themselves profess to give their services without any species of remuneration; but the shareholders usually vote a small sum to be put at their disposal, adequate to meet absolutely necessary expenses. Where the duties are very onerous, a special allowance per annum is voted to the chairman. It is likewise customary for the directors to have free passes over the line, which privilege is also enjoyed by the secretary and some other officials. In some instances, a free pass for a day is given to the shareholders to enable them to attend the stated half-yearly or special meetings. The principal business at the half-yearly meetings is the reading and approval of the 'report' of the directors. As the report is always printed and circulated previously, all are prepared to discuss its merits. Shareholders seldom oppose the approval of the report, and still more rarely are they successful when they do so—the integrity and discretion of directors for the most part justifying confidence in their management.

The organisation of the present railway system has not depended on the private acts authorising the several undertakings. There is now a body of general railway law, springing from a number of public acts, which have from time to time received the grave consideration of the legislature. These

statutes date from 1838 till 1864; some of the more important were passed in 1845; among these were several comprehensive statutes, including 'The Companies Clauses Consolidation Act,' and 'The Companies Clauses Consolidation (Scotland) Act;' also 'Railway and Lands Clauses Consolidation Acts;' to which supplementary acts were added in 1863. (See *Hand-book of Railway Law*, by A. Moore.) Among the diversity of matters treated of are as follows—obligations as to carrying mails, and conveyance of troops and police; regulations as to gates at level crossings, signals, and junctions; penalties for obstructing engines or railway officers, and trespassing on lines; limitations of gradients and curves; gauge: time within which railway must be made; notices to be given to Board of Trade before line can be opened, and not to be opened without authority, after due examination of works; returns to Board of Trade as to accidents; maintaining of fences; making of sidings for farming and other purposes; one cheap train to be run each way daily; rules for registering and transferring shares; voting according to ratio of shares held; payment of poor-rates and public assessments; leasing of lines; agreements to work lines; surrender of shares; authority to buy, hire, and use steam-vessels; &c.

Besides these public acts, there is a code of regulations as regards the mode of commencing and carrying railway bills through the Houses of Parliament. This code, embodied in a work issued annually, is styled *Standing Orders of the Lords and Commons relative to Private Bills* (1 vol. 12mo, issued by Waterlow and Sons, Westminster). With this, all parties engaged in procuring railway acts require to be well acquainted, for neglect of any of the prescribed forms is almost certain to be fatal. We give the following as specimens of 'Standing Orders:' Notices of applications for acts to be advertised in October or November; plans, sections, and books of reference to be lodged with clerk of the peace or sheriff-clerk of county for public inspection, on or before 30th November [often an immense struggle up till last moment to get this done]; petitions for act stating particulars to be lodged at the Private Bill Office of the House of Commons on or before 23d December; on or before same date, copy of proposed bill to be lodged with Board of Trade; on or before 31st December, declarations, lists of owners, lessees, and occupiers, also estimate of expense, to be deposited in Private Bill Office; a sum not less than eight per cent. of the estimated expense to be deposited with the Court of Chancery, England, an officer of the Court of Exchequer, Scotland, or Court of Chancery, Ireland, previous to 15th January; examination of petitions to commence on 18th January; if promoters do not appear after a notice of seven clear days, examiners may throw out petition; certification by examiners whether standing orders have been complied with; bill submitted to select committee; proceedings in opposed bills; report of Board of Trade on bill; report of Board of Admiralty on bill, should any tidal or navigable river be proposed to be interfered with; preamble of bill proved or otherwise; bill to give power for future revision by parliament, &c. There are equally explicit standing orders as regards the House of Lords, whose chairman of committees subjects all private bills to a sifting examination. Whatever, therefore, may have been the negligence of the government at the outset, railway legislation has latterly received a painful degree of attention. As marking a desire for simplifying procedure and lessening expenses, parliament passed an act, 1864, giving the Board of Trade power to authorise bills for a smaller class of railways, provided they were unopposed—a concession which may promote a minor but useful kind of branch-lines.

In issuing the prospectus of a railway, an estimate is given of the probable amount of traffic of all kinds; but in every case, sometimes to a surprising degree, the traffic exceeds expectation. Railways have not improperly been compared to navigable rivers. To inland and not easily reached towns, they impart the character of a seaport, placed in ready communication with all the world. The exciting of a desire to travel, and the developing of local trade and resources, accordingly attend on railway undertakings, and the consequence is a universal activity and prosperity. So fully is this known, that bigoted opposition to railways has disappeared among the landed gentry; and the impression now is, that the greater number of existing common roads are destined to be superseded by these iron highways.

Railways were at first detached undertakings, between one large town and another, but now many of the companies have for mutual advantage amalgamated in groups; and in a number of cases, for economy in working, lesser lines have been leased to companies of larger means. In this, as in most other commercial concerns in Great Britain, the tendency is to concentrate business in the hands of monopolists possessing large capital, or at least those having a great capacity and disposition to borrow. One of the advantageous results of a union of railway interests is, that passengers are able to procure 'through-tickets' to carry them forward for hundreds of miles without delay or change of carriage; but it is not less conspicuous that the 'railway interest' has become a formidable power in the state, and is able to carry lines almost anywhere, in disregard of land-proprietors or town-authorities, as if the destruction of rural amenity and the wholesale ruin of dwellings were matters of perfect indifference. Making every allowance, therefore, for the high social value of the railway system, it has certainly reached a point of despotic overbearance that requires some species of control more effectual than that which is embraced in the irregular action of parliamentary committees or of the Board of Trade.

CONSTRUCTION.—Railways in the United Kingdom are of two kinds—double and single. The double consists of two lines of rails—an *up*-line, conducting towards, and a *down*-line, leading from the metropolis or principal [illegible] of traffic. By far the larger number of lines are of this double variety. Single lines, with places where trains may pass each other, are mostly of recent construction, and have received their chief development in Scotland. Whether double or single, all the lines are enclosed by fences—stone-walls, palings, hedges, or stretches of wire. At the chief terminus, there is a group of buildings for offices, workshops, sheds for locomotives, &c. Along the lines, there are stations at distances of two to ten miles. At the termini and stations, there are raised platforms for the accommodation of passengers. The principal stations are under cover, and are provided with waiting-rooms. When lines pass through a town, they are carefully secluded. Recently, there have been great improvements as regards fixed signal-posts, and the processes for shunting trains.

The construction of a railway is the business of contractors, who execute the works by estimate, according to the plans and specifications of the engineers. A railway contractor is a capitalist with a practical knowledge of earth-digging, blasting rocks, pumping, embanking, boring and building tunnels, erecting bridges, and other rough operations. He possesses a stock of wheelbarrows, picks,

and shovels, carts, earth-wagons, horses, light rails and sleepers for temporary purposes, and other professional machinery, including one or more locomotives for dragging materials. Acting himself as commander-in-chief, he has subordinates called time-keepers, foremen, gangers, and under-gangers, placed over detachments of operatives. These operatives are a remarkable class of men. Originally from Lincolnshire and Lancashire, they are popularly known as *navvies*, from having been engaged in excavating navigable canals. The genuine navvy is an interesting specimen of a strong-built, hearty, industrious, and illiterate English rural labourer; his dress, a round felt-hat, coloured plush waistcoat, loose flannel jacket, corduroy breeches, and laced quarter-boots—appetite for beef, fried ham, and ale immense. With muscular strength corresponding to his appetite, the navvy is a proficient at using the pick, shovelling earth, and handling a wheelbarrow, which, with a load of one to two hundredweight, he trundles along a plank, and tips over with uncommon dexterity. Navvies sometimes labour in bands, called *Butty gangs*, by piece-work, and are known to draw large sums, but more generally they are employed at days' wages—their time being kept by a clerk to ensure steadiness of work. At a distance from towns, they and their families live in rudely-constructed huts, near which is placed a store, for the sale of articles they may require. Their pay-day is usually every fortnight, on which occasion much of their earnings is heedlessly dissipated, and sometimes serious brawls, calling for the interference of the police, occur on these occasions. It has been stated on good authority, that a sum equal to £1000 per mile on all the railways in Great Britain, has thus been wastefully squandered by navvies.

Curves and Gradients.—Engineers endeavour to render their lines as level and straight as possible, but circumstances often necessitate the use of considerable curves and gradients. As a general rule, there are few curves of less than three-eighths of a mile or 30 chains' radius; when they are employed, the exterior rail is super-elevated, to counteract the centrifugal force, otherwise a quickly moving train might leave the rails. Gradients being expensive to work according to their degree of inclination, few are more steep than 1 in 60, though 1 in 30 is not unknown. When the gradient is steeper than this stationary engines are usually employed.

Gauge and Earth-works.—In the early stage of railway operations, the gauge or width between the rails excited considerable discussion. When way-leaves, or tramways, were introduced in the coal districts, their gauge was adapted to the common road-wagons that were to be put upon them, and it happened that the gauge between the wheels of these wagons was 4 feet 8½ inches. Accustomed to this width, George Stephenson believed that it 'was most economical in construction, not only as regarded the engines and carriages, but more particularly of the railway itself.' This gauge was accordingly adopted on most of the earlier-made railways, and, notwithstanding the keen contests of engineers, who were generally favourable to a 5 feet or 5 feet 3 inches gauge—Brunel contending for 7 feet—this original 4 feet 8½ inches gauge—measured from the inside of one rail to the inside of the other—was irrevocably fixed by a public act, 1846, as applicable to all the railways in England and Scotland, the Great Western and certain branches excepted, on which the gauge was regulated at 7 feet. By the same act, the gauge in Ireland was fixed at 5 feet 3 inches—a width now understood to be greatly preferable to the narrower gauge, as admitting of better passenger accommodation, with a lower and more safe centre of gravity. The government of India has fixed the gauge of all the railways in that country at 5 feet 6 inches. A space of 6 feet is ordinarily allowed between the up and down lines of rails, making the entire breadth of way, including the thickness of the rails, 16 feet. From both sides, there is a slope of 18 inches deep, to drain off the water that may fall on the line; and at the foot of this slope, a narrow level strip is allowed for a pathway, to accommodate 'plate-layers.' The average breadth of 'formation' is 18 feet for a single, and 28 feet for a double line. If upon an embankment, there is a slope from the pathway to its base. As the sides of embankments and cuttings are neatly dressed off, and if practicable, sown with grass seeds, English railways have a carefully executed and trim appearance.

Ballast.—This is the name given to the mass of broken stones or dry gravel on which the sleepers are placed, and which serves to keep them steady. Material for ballast is generally got in the cuttings or near the line, but is often brought a considerable distance. The term *ballast* originated in the practice of using the gravel-ballast emptied from the ships in the Tyne, for the tram and railways in the neighbourhood of Newcastle.

Rails.—All the rails are of malleable iron—cast-iron not being now tolerated—but steel-rails are coming into use, where there is a continuous heavy traffic. The rails differ in shape and weight. The most common form is that of which we present a section, fig. 1; for bridges and the wide guage, where longitudinal sleepers are employed, the form, of which there is a section (fig. 2), is preferred. Cross-sleepers are laid at usually 3 feet or 3 feet 6 inches apart.


Fig. 1.

On these sleepers the *chairs* of cast-iron are fixed, and the rails set in their place on the chairs, are held firmly down by iron spikes. The ends of the rails are now almost always joined together by a massive plate of malleable iron placed on each side called a fish-plate; two of them are used at each joint, and are bolted together by four strong bolts passing through the rails. In the joining of the rails end to end, to make a smooth surface, great care is bestowed; perfect steadiness in the required line of direction is secured by means of wooden wedges acting on the rails and the chairs. In the adjoining cut, fig. 2, are represented two rails, A,

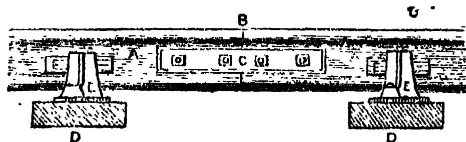


Fig. 2.

joined end to end at B, held fast together by the fish-plate C. The sections of the wooden sleepers are shewn in D, D, on which are the chairs E, E. The wooden wedges are marked F, F.

Hitherto, the sleepers have been of seasoned native larch, as the most durable, but latterly, from the growing scarcity and cost of this article, sleepers have been made of imported timber from ports in the Baltic. Such imported timber requires to be *creosoted*. Many patents have been taken for rails which, from the peculiar size of the lower flange, dispense with sleepers entirely, but none have found much favour; of late a cast-iron sleeper, very much

the shape of a pot lid, having the chair cast on the top, has been much used by English engineers on railways abroad, and even at home where timber is scarce, and the ballast of a sandy nature, and has given much satisfaction in India and elsewhere.

Tunnels and Viaducts.—Tunnels are avoided as far as possible, for, besides their costliness, they, if long, necessitate the constant use of lamps in the carriages. They are made only when the excavations would be more than 60 feet in depth, or when land-proprietors force their adoption, in order to spare the amenity of grounds near a mansion. For this latter reason, some short tunnels are known to have cost railway companies as much as £50,000. Latterly, the execution of underground railways in the metropolis has offered examples of tunnelling more extensive than were previously known in England, and at the same time popularised a method of subterranean transit almost as marvellous as anything in the way of viaducts across wide and profound chasms. As regards viaducts, they consist of stone bridges of handsome architecture, or as commonly of malleable-iron girders of various forms set in stone piers. In the construction of these stone and iron viaducts, there is a growing boldness of conception, arising not only from the success of the famed railway viaducts across the Menai Straits, the river Tamar, and the St Lawrence, but from the greater experience and skill of engineers.

Cost of Permanent Way.—Owing to the obstructions offered by landowners, and their excessive claims for amenity damages, also the opposition of rival companies, the cost of railways was at one time very much greater than it is at present. The expenditure incurred in securing legislative authority to construct railways, was likewise enormous. The parliamentary costs of the Brighton Railway averaged £4806 per mile; of the Manchester and Birmingham, £5190 per mile; and of the Blackwall, £14,414 per mile! The cost of carrying the Liverpool and Manchester line was £27,000. It has been shewn that the solicitor's bill for the South-eastern Railway contained 10,000 folios, and amounted to £240,000. These few facts, however, afford but a feeble idea of the reckless wastefulness of capital on railway undertakings; it is universally allowed that, under a better policy, not only a much better railway-system might have been provided, but a saving effected of at least fifty millions.

In ordinary cases, railways with a double line are constructed in England at a cost of £12,000 per mile, station-houses, signals, and all other fixed plant included. Single lines are made at perhaps a fourth less, but nowhere in the United Kingdom have they been executed so economically as in Scotland. There, some single lines have cost for land and everything not more than about £5000 per mile—such economy, however, being greatly due to the fact that the undertakings were promoted and watched over by bodies of land-proprietors deeply interested in restraining expenditure. Of these cheap Scotch lines a good example is offered by the Peebles railway (practically a branch of the North British), extending to 18¾ miles, the entire cost of which, land and station-houses included, was about £95,000. The cost of rolling stock was additional. This economically-constructed line, managed with a scrupulous attention to details, under the care of directors (mostly land-proprietors) who have ever given their services gratuitously, has latterly been paying a dividend of 6 per cent. per annum on its ordinary, and 5 per cent per annum on its preference, shares.

Maintenance of Way.—Every railway, great or small, is at a considerable expense in keeping the line in proper working order, for which purpose a staff of officials is required. Besides a general superintendent there is an effective staff of 'plate-layers,' whose duty it is to watch over the permanent way, to make small repairs, and to report to the superintendent if anything is seriously deranged. The number of plate-layers on a good piece of road should not exceed three men to each two miles. To stimulate their vigilance, a reward of 5s. is, on some lines, given for every broken rail that is promptly discovered. Plate-layers' cottages are erected at convenient distances along the railway. In some instances, the cottage adjoins a level crossing, at which gates have to be kept shut across the line to admit the passage of carts, horses, &c., and opened only when trains give the signal of approach; in such cases (mostly on small lines, where economy is studied) the plate-layer's wife is constituted 'gate-keeper.' Latterly, parliament has been reluctant to allow level crossings; and these are now chiefly confined to by-ways or parish roads with little general traffic.

ROLLING STOCK.—Under this head are comprehended locomotives, carriages, and trucks, for goods and minerals, the whole forming an important part of railway undertakings.

Locomotives.—These are of various kinds—four-wheeled and six-wheeled, according as small or large machines are desirable for the traffic. In some varieties, the tender for fuel and water forms an extension of the locomotive, such being called 'tank engines,' but for the most part the tender is detached, and only connected by couplings. The cost of a six-wheeled locomotive of the best class is about £2500.

Carriages.—There are three distinct kinds of carriages to suit the several classes of passengers, the only variation being when a carriage comprehends first and second class compartments. A first-class carriage consists of three distinct compartments, like three coaches united. The compartments are in some cases fitted for six passengers, three on each side, sitting face to face; in other cases, eight are accommodated; but in any case one half the passengers sit with their back, and the others with their face, to the locomotive. The cost of a first-class carriage with three compartments, as shewn in fig. 3, is about £600. The carriage here represented

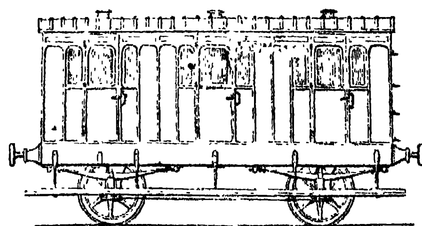


Fig. 3.

is of the newest style of construction and embellishment. Exteriorly, the body of the carriage is of light-coloured wood varnished. The windows are of plate-glass, and each compartment is lighted with a lamp at night, or when tunnels are to be passed through. The tops of the three lamp-covers are seen surmounting the roof. A foot-plank for the guard extends on each side, level with the axles of the wheels. On some railways there are 'saloon carriages,' which are of a spacious and splendid character, for the accommodation of royalty.

Wagons and Luggage Vans.—To accommodate its traffic, every railway must be provided with a

large stock of trucks or wagons for carrying goods, minerals, cattle, timber, and other articles. The

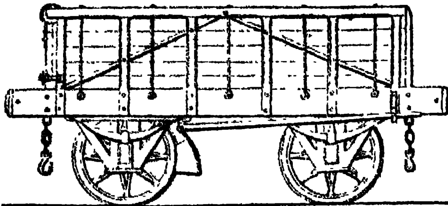


Fig. 4.

ordinary English coal-wagon is pictured in fig. 4, and the closed luggage-van, with a seat for the guard, in fig. 5. Trucks for carrying timber are

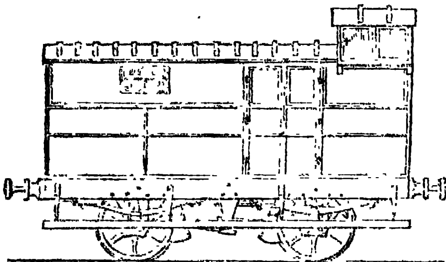


Fig. 5.

usually shallow in the ledges, and furnished with swivel bars, on which the timber rests.

TRAFFIC.—The traffic on railways is of two distinct kinds—passengers and goods; with the goods we include minerals, also timber and other bulky articles. The passenger and goods traffic are placed under separate managements. Usually, there are passenger-trains and goods-trains. As minerals are carried on trucks without spring-buffers, it is inconvenient and damaging to unite them to passenger-carriages.

In every part of the United Kingdom, railway passengers are of three classes—first, second, and third. For the first and second, there are distinct carriages or compartments of carriages; for the third, the carriages are always distinct. The first-class compartments are handsomely fitted up with stuffed cloth seats and backs, are provided with straps for sustaining hats, a netting for umbrellas and small packages, and in winter they are furnished with long-shaped tin vessels of hot water for the feet, which vessels are renewed at certain points in the journey. Though from the fares charged, first-class carriages possess an air of exclusiveness, no more objection is popularly taken to them than to the use of boxes in theatres; and, indeed, they are universally recognised as an advantage, for the reason that by the comparatively high fares exacted for them, the companies are enabled to lower the charges for second and third-class passengers. On some lines, first-class compartments are set aside for ladies, if they please to use them. In none of the ordinary carriages is smoking allowed; but on a few lines, as in Germany, there are compartments for smokers. The first-class passengers have distinct waiting-rooms at the termini and stations, with generally a waiting-room in addition for ladies; for the second and third class, there is a waiting-room in common. The several waiting-rooms are neatly fitted up, and provided with suitable conveniences, including basins and water for washing the hands—accommodations which contrast favourably with what were furnished to travellers in the old coaching establishments. The waiting-rooms are open all day to the public, and there is seldom any restriction as to going on the platforms. Tickets are sold at a wicket not earlier than a quarter of an hour before the starting of the train. At the larger termini, there is a wicket for the first, and a wicket for the second and third, class. The tickets, marked in consecutive numbers, are stamped with the date on delivery, and excepting 'return tickets,' will not answer for any other day. Return tickets at a fare and a half are issued on most lines for the date of issue, or from Friday till Monday. On most lines, monthly, three-monthly, and season tickets are issued for first-class, not transferable, at a considerable reduction on ordinary fares. To encourage the building of villas at a distance of ten to twenty miles from termini, by which means a traffic may be developed, some companies give a personal ticket free for a number of years corresponding to the valued rental of the villa. For example, the builder or first occupant of a villa valued at £45 per annum, will receive a ticket for three years (taking him, if he pleases, daily, by all the trains during that period); if valued at £60, a ticket for five years. Much permanent traffic has in this manner been created in the neighbourhood of London.

The number of trains run daily depends on the pleasure of the directors. There are ordinary, mail, and express, trains; of this last kind, two usually go each way daily, the fares on which are higher than by the others. Ordinary fares are about $2\frac{1}{2}d.$ per mile first class, $1\frac{3}{4}d.$ second class, and $1d.$ to $1\frac{1}{2}d.$ third class; but on some lines the fares are considerably lower. According to one of the provisions of a general act, all companies must run one train daily each way, stopping at all stations, and at a rate of speed not less than 12 miles per hour, at a fare of a penny a mile. Children under three years of age going with passengers are free, and those from 3 to 12 years pay only half-fare. With few exceptions, the companies run two passenger-trains each way on Sundays, as far as possible avoiding the hours of divine service. By an act, 5 and 6 Vict. cap. 79, there is payable to government 'a duty at and after the rate of £5 per £100 upon all sums received or charged for the Hire, Fare, or Conveyance of all Passengers.' By 7 and 8 Vict. cap. 85, it is enacted that no tax shall be levied on the receipts for passengers conveyed at fares not exceeding one penny per mile; but by the 26 and 27 Vict. cap. 33, it is enacted that this exemption shall only extend to trains running six days in the week, or on market-days for the conveyance of passengers at one penny per mile. From this passenger-tax, Ireland is exempted.

All passenger-trains are accompanied by a 'guard' or conductor—the official who is charged with the responsible duty of conducting the train according to certain printed regulations, of which he possesses a copy. For the most part guards are intelligent and obliging persons, who do all in their power to render service to the passengers, within the prescribed rules. Nor must it be omitted, that although fees to any of the railway servants are strictly forbidden, the porters on duty are remarkable for the trouble they take to carry luggage, find cabs at the termini, and to answer civilly such inquiries as may be put to them by strangers. It may be said with perfect justice, that in no department of affairs in Great Britain is there seen such readiness to oblige as in that connected with railways. Considering, also, the vast number of

servants on some lines—the number on one line and its affiliated branches being 20,000—the general good conduct that is shewn, and the few accidents that occur, constitute a gratifying social phenomenon. The guard, porters, and some other officials wear a neat and distinctive uniform.

According to English routine, passengers are allowed to find their way promiscuously to the proper carriages, the only check being a call by the guard to 'shew tickets' previous to starting. At the termini, on closing the journey, tickets are collected by the guard; at the intermediate stations, tickets are given up to a porter at the exit wicket. All passengers are expected to see their luggage labelled for the place of destination, and to point out what belongs to them on arrival. This is a loose practice, often remonstrated against, but it suits the temperament and self-relying habits of the people. Amidst the crush of traffic and with little time to spare, the formalities of the continental system would be unendurable. Should labelled packages, resigned to the porters and guard, be lost, recourse lies against the company. Passengers may place small portions of luggage below their seats, but for these the company is not accountable. At the termini of the principal lines, and at important stations, there are refreshment rooms or stalls, for the most part well provided with materials for breakfast, lunch, and dinner. On the London and North-western line, and perhaps on others, there is a practice convenient to travellers. The guard asks who intends to dine at a particular place, and telegraphs the fact to the keeper of the dining-room, who has everything ready accordingly at the proper moment. At all the chief stations there are stalls for the sale of time-tables, newspapers, and small books of an amusing kind. See BOOK-TRADE. The sale of morning newspapers is so very considerable, that some of the first-class carriages assume for a time the appearance of a reading-room.

One of the good features of British railway transit is accuracy in starting and arriving at the prescribed time, a circumstance proximately owing to the vigilance of the guard and his strict attention to the rules of the company. Another peculiarity consists in the privacy secured to passengers while on their journey. Instead of being intruded on as in the American, Swiss, and some other railways, by the constant perambulation of the guard through the train, they are left unmolested to read, talk, or sleep, according as fancy may direct. This very seclusion, however, is thought to be attended with a disadvantage—namely, that passengers are unable to call for the assistance of the guard in cases of threatened outrage by one of their number. Latterly, there has been much newspaper discussion on this point, and various projects have been suggested for summoning the guard, and, if need be, arresting the progress of the train. To all devices of this kind there is unfortunately the grave objection, that if passengers were enabled to call the guard at pleasure, they would frequently do so for no sufficient reason, as whim or imaginary fear prompted; also, that the unexpected stoppage of trains would seriously derange the keeping of time, and in many lines jeopardise the safety of the whole of the passengers. Seemingly, it would be difficult to fall upon any plan free of this species of objection, unless recourse be had to the American construction of carriages, and the free perambulation of the guard through the trains—a remedy which involves a revolution in English railway transit, as well as in English feelings and manners.

To enable companies to reckon easily with each other as regards intercommunication of traffic in passengers, goods, use of carriages, &c., an institution called the Clearing House has been established in London, to which tickets are transmitted for cross-reckoning and settlement. There is a similar establishment in Dublin. See CLEARING HOUSE.

Cost of Working.—The cost of working railways, including general expenditure, in Great Britain amounts to from 48 to 50 per cent. of the returns from traffic. The remainder forms the divisible profit to pay—1st, the interest on debentures; and 2d, the dividend to shareholders. Of these shareholders, some, as defined by statute, have a preference claim of 5 per cent. per annum, what is left over being divisible among the ordinary or original shareholders. In the general expenditure of railway companies is included the outlay for passenger-tax, also police, poor, and parish-rates. Considering that railways promote the prosperity of every district which they traverse, it certainly seems a kind of hardship that they should be rated for local purposes like any ordinary property in a parish. Besides supporting the poor, the railways in Scotland are rated like Heritors (q. v.) for building new parish-churches.

According to a return made by railway companies to the Board of Trade in 1862, the cost of running trains was on an average 2*s.* 7¼*d.* per mile, or about £13 for 100 miles. At this rate, 1000 passengers of mixed classes can be conveyed 100 miles in 25 carriages, as follows: Every first-class passenger for the 100 miles, 6*d.*, second class 4*d.*, and third-class 2½*d.* From this it appears that lowness of fares can be secured only by a large and well-sustained traffic; and that the main reason why fares are much higher than they seemingly might be, is the frequent insufficiency of the number of passengers compared with the accommodation provided for them. A striking exemplification of the possibility of conveying large numbers at very low fares is afforded in the case of 'excursion trains,' in which sometimes 1000 individuals are taken 50 or more miles, and brought back the same day for one or two shillings each.

STATISTICS.—Every year a return is rendered by the Board of Trade to the House of Commons embracing a large variety of particulars concerning railways. The return dated February 8, 1864, gives the following statistics for the United Kingdom for the year ending December 31, 1863: Number of miles open, double lines, 7270; single lines, 5052—total, 12,322. Number of passengers (exclusive of holders of season and periodical tickets), first class, 26,086,008; second class, 57,476,669; third class, 121,072,398—total, 204,635,075. Number of carriages, 71,938. Number of horses carried, 275,238; number of dogs, 430,644. Live stock carried—cattle, 3,155,071; sheep, 7,761,884; pigs, 2,112,720. Minerals carried, 68,043,154 tons. General merchandise, 32,517,247 tons. Passenger-trains, 2,917,660; goods-trains, 1,758,033—total trains, 4,675,693. Miles travelled by passenger-trains, 61,032,143; by goods-trains, 55,560,018—total, 116,592,161. Receipts from passengers—first class, £3,368,676; second class, £4,201,105; third class, £4,933,073; holders of season and periodical tickets, £334,256—total from passengers, £12,837,110. Receipts for parcels, horses, dogs, &c. by passenger-trains, £1,136,259; receipts for carrying mails, £548,159. Total receipts from passenger-trains, £14,521,528. Receipts for live-stock, £636,773; for minerals, £5,419,667; for general merchandise, £10,578,429—total of goods traffic, £16,634,869. Total receipts from all services, £31,076,165 (in 1865, probably £36,000,000). Working expenses—maintenance of way, £2,817,287; locomotive power and stationary engines, £4,150,499;

repairs and renewals of carriages and wagons, £1,402,356; traffic charges (coaching and merchandise), £1,196,122; rates and taxes, £631,127; government duty, £395,234; compensation for personal injury, £179,565; compensation and damage from loss of goods, £68,242; legal and parliamentary expenses, £194,782; miscellaneous expenditure, not included in the foregoing, £962,020. Total working expenditure, £15,027,234; net balance of receipts over expenditure, £16,048,931. Proportion of expenditure to receipts, 48 per cent. Vehicles of all sorts employed—locomotives, 6643; carriages for passengers, 15,886; other vehicles attached to passenger-trains, 6135; wagons for live stock, minerals, and merchandise, 191,344; other vehicles not in these classes, 5759—total of every kind, 228,767. Authorised capital, by shares, £355,700,795; by loans, £119,298,750—total, £474,999,545. Total paid up on shares and debenture loans, £404,215,802. No summary is given of the average rate per cent. of dividend per annum, which from the tables seems for the most part to be 4½ per cent; in some instances it is as low as 1, in others it is as high as 6, and rarely higher. The general average is by computation 4·16 per cent.—acknowledgedly an insufficient return on outlay, but the inadequacy of the amount is due in a great degree to the waste of capital on parliamentary contests, and also on the construction of lines to supersede or rival others already in operation.

At present (March 1865), the number of miles open in the United Kingdom is about 15,000, and as many as 400 bills for new lines of one kind or other are before the houses of parliament. Anticipatory of the chaotic condition into which the railway system might possibly subside, an act of parliament was passed in 1844, for the purpose of enabling government to purchase all lines in the United Kingdom, after they had respectively been 21 years in existence, dating from the passing of the act. This statute comes into operation in 1865, and five-sixths of the existing railways will eventually be subject to its provisions. The terms on which the purchase can be effected are these—a sum is to be paid equal to twenty-five years of the divisible profits, taken at an average of the preceding three years, or at a valuation if the company should prefer it. The enormous sum required to buy up existing lines—perhaps £500,000,000—and the generally imperfect character of government management, to say nothing of objections on political grounds, will probably prevent any formidable action under the statute just specified.

Accidents.—During the year ending December 31, 1863, the number of railway accidents (collisions, running off lines, breaking of axles, &c.) in connection with passenger-trains in the United Kingdom was 52—passengers killed, 13; passengers injured, 400; number of servants of companies killed, 7; injured, 35—total killed, 20; injured, 435. Number of accidents to goods and mineral-trains, 60; servants of companies killed, 13; injured, 43; other persons injured, 2. Grand total killed, 24; injured, 445. That out of about 205,000,000 passengers, only 13 were killed by accidents, is a fact most significant of the general good management of railways in the United Kingdom.

Foreign Railways.—The first foreign country that availed itself of railway locomotion was the small kingdom of Belgium, where a number of lines in connection with each other were constructed between 1834 and 1836, and in about ten years afterwards the group was nearly completed in a well-devised and comprehensive scheme. At the beginning of 1864, the number of miles in operation in Belgium was 1073, about eight-tenths of which were the work of government; and we are told, on good authority, that the cost has been on an average £18,000 per mile, but this seems to include expenses on rolling stock. From Belgium railways spread to France, where they were laid down on a plan prescribed by the government, which offered special encouragement to capitalists. The method adopted was to give the land and make the bridges, but besides these heavy items of expenditure, the government was in a number of instances at the cost of the entire permanent way. So far favoured, the promoters, who formed a company, had only to find capital to work and maintain the line. The government, however, relinquished the property only on the footing of a lease for such a number of years as a company was disposed to be satisfied with. Tenders were ordinarily taken from competing bodies of promoters; in this manner the 'concession,' or right of tenancy, has been adjusted at from 50 to 99 years; at the end of the prescribed periods the lines will fall into the hands of the government. Latterly, the French system has outgrown this kind of tutelage; and there is a disposition in companies to act on an independent footing; the state, however, has secured a very general right of property in the existing lines, whether by the method of assistance originally fallen upon, or by giving large subventions of money, on the plan of receiving a share of profits after a certain dividend has been reached. By means of these subventions, as well as a species of guaranteed monopoly of traffic, the profits to shareholders in some French lines, reach from 10 to 12 per cent. Within 99 years from 1852, a large proportion of the French railways will lapse into possession of the state. On one or other of the various plans of government helping companies, and preventing ruinous competition, nearly the whole railway system of continental Europe, Asia, and Africa is established; and in a large number of the foreign railway undertakings everywhere much British capital is invested. The principal continental railways, particularly in France and Belgium, are double lines, and under good management; but the rate of transit is generally slower than in England, and the formalities as to taking tickets and being allowed to enter the trains are exceedingly troublesome.

Various continental lines have been constructed by English contractors, who employed English navvies for the purpose along with the usual apparatus of trucks, wheelbarrows, &c. In Italy, however, as lately as 1862, we observed that the work of construction was performed in a tedious and laborious manner by women and girls, who carried the earth in baskets on their heads, under the superintendence of taskmasters with whips—a sorrowful spectacle, and the more surprising as being in a country noted for its advancement in practical engineering.

In Canada, Nova Scotia, and Australia, railways have been successfully established; but in no British dependency has the railway system been latterly pushed forward with such activity or likelihood of advantage as in India, where, at the end of 1863, lines had been sanctioned which would cost £60,000,000, and about 1000 miles were opened for traffic. The undertakings have been materially assisted by government, by giving the land to the companies, by subventions in proportion to the actual outlay, and in some instances by guarantees of a minimum dividend of 5 per cent. to shareholders. In the execution of railways in India, the mercantile community of Great Britain have taken a deep interest, for hitherto the difficulty and cost of transit of cotton and other bulky articles of

export from that vast dependency has proved a serious detriment to commercial intercourse.

Railways in the United States date from 1830, when a short line was made in Massachusetts. Since that year, the progress of railways has kept pace with, if not exceeded, that of Great Britain. All the American lines are constructed and worked by private companies, but in other respects they differ materially from similar undertakings in England. A few peculiarities of the American routine may be noted. The cost of procuring legislative authority to make the lines has usually been very small; the lines are mostly single, and the land for them has often been either given for nothing, or for a comparatively trifling consideration; the lines have generally no fences, and they go through populous towns along the open streets without restriction or fear of the consequences, the only care taken against accidents is for the driver to ring a bell, and it is usual to put up boards with the inscription: 'Look out for the locomotive when the bell rings;' tickets are sold by the guard or at offices throughout a town without fixing a date, just as ordinary articles are sold at a shop; the waiting-rooms are generally of a poor description; as regards passengers, all varieties (negroes excepted) travel in one carriage; and lastly, there is a marked deficiency of porters, station-keepers, and other officials either to give information or render assistance to passengers. We may add, that the trains proceed at a comparatively slow rate, and (as came within our experience) seem to stop at the discretion of the conductor—the whole organisation and management being, in fact, on a loose and niggardly footing, though perhaps well adapted to the raw condition of a large part of the country. As the conductors receive back as well as sell tickets, there is practically no check on their intromissions, and it is jocularly remarked that they, for the most part, grow rich while in office. The seats in the 'cars,' as they are termed, are arranged in rows, with a passage up the middle for the conductor, who, by means of a small platform at each end, can step from carriage to carriage, and perambulate the train at pleasure, which he is constantly doing in the performance of his ticket-selling and ticket-taking duty. The wheels being attached to a swivel or *bogie* framework, the cars can turn round corners with the ease and security of a gentleman's carriage; this being the most ingenious of the American mechanical arrangements. Altogether, the railway system of the United States can in no shape be brought into comparison with that of the United Kingdom, for the two things are constituted on very different principles. The chief desire in America has been to open up the country at all hazards to railway communication, leaving improvements to be effected afterwards by the wealth which that communication is almost certain to create. On the contrary, in Great Britain and Ireland, there has been no pervading aim of this kind; every railway scheme has been legislated for and loaded with expenses as if it were a matter of indifference to the nation whether such projects should be carried out or not; and, as is well known, the comfort and convenience of passengers has, on the whole, at whatever cost, been a matter of primary concern to the companies.

Works that may be consulted on railways: *History of the English Railway*, by John Francis, 2 vols., 1851; *Our Iron Roads*, by F. S. Williams, 1852; *Railway Economy*, by Dr Lardner; Smiles's *Life of George Stephenson; Railways*, by R. Ritchie; *Railway Reform; its Importance*, by W. Galt, 1864; *Bradshaw's Railway Manual, and Shareholder's Guide and Directory*, published annually; also several newspapers devoted to railway subjects, issued weekly in London, the oldest of which is that known as *Herapath's Railway Journal*. We cannot close this notice without adverting to the important service rendered to the travelling community in the United Kingdom, by *Bradshaw's Railway and Steam-navigation Guide*, so well known to the public for its comprehensive and carefully constructed Time-tables (q. v.). In France, Germany, the United States, and other countries, railway-time tables are now issued, weekly or monthly, on the plan so successfully established by Mr Bradshaw, whose *Guide*, however, is not excelled for accuracy, cheapness, or the extent of its information. W. C.

RAIMONDI, Marc Antonio, a celebrated engraver, was born at Bologna in 1487 or 1488. He studied for several years under the celebrated painter Francia, the head of the old Bolognese School. On quitting Francia's studio, he went to Venice, and having seen there, for the first time, prints from the woodcuts after Albert Dürer, he engraved on copper two sets of prints from that great master's designs, viz., those illustrating the 'Life of the Virgin,' and of the 'Life and Passion of Christ;' to that of the former he attached the cipher or monogram of Albert Dürer, and it is said that the artist complained of the deception to the senate, but only obtained an order that in future the monogram of Albert Dürer should not be copied; at all events, the latter set is without the monogram or mark. From Venice, R. proceeded to Rome, soon attracted the notice of Raphael, and engraved those works after that master that are so highly valued. R. greatly improved his style by imitating the remarkable delicacy and clearness exhibited in the engravings of Albert Dürer and Lucas Van Leyden; and though, perhaps, in these qualities he did not surpass, or perhaps equal, these masters, he went far beyond them in power and purity of drawing, which he carried further than any other engraver; indeed, it has been stated that Raphael himself assisted the engraver in drawing on several of the plates.

After Raphael's death, having engraved some plates after drawings of a licentious kind by Giulio Romano, he was thrown into prison by Clement VII., but was afterwards liberated, taken under the protection of the pope, and fully employed. This prosperous state of matters, however, soon terminated, for on the sack of Rome by the Spaniards under the Constable Bourbon, in 1527, he was plundered of all he had, and was obliged to flee and take refuge in Bologna, where he seems to have lived till the period of his death, the exact date of which is not known, but it must have been after 1539, for a print by him, after Giulio Romano, of the 'Battle of the Lapithæ,' bears that date.

Good impressions of this eminent engraver's works bear, perhaps, a higher value than any other engravings; but there are numerous impressions from his plates to be met with which are of little value, having been thrown off after they had been greatly worn, and repeatedly retouched. The best impressions are without the name of any publisher. After the plates were taken from the stock of Tommaso Barlacchi, they came into the possession of Antonio Salamanca; afterwards, they passed through the hands of Antonio Lafreri, from thence to Nicholas van Aelst, and lastly, became the property of Rossi or De Rubeis, and by that time they had been completely worn out.—See catalogue of R.'s engravings by Baron Heinecken, and Bartsch, vol. 14. Very fine collections are to be seen in the British Museum and the Louvre.

RAIN. At a given temperature, air is capable of containing no more than a certain quantity of aqueous vapour invisibly dissolved through it, and when this amount is present, it is said to be saturated. Air may at any time be brought to a state of saturation by reducing its temperature; and if it be cooled below this point, the whole of the vapour can now no longer be held in suspension, but a part of it, passing from the gaseous to the liquid state, will be deposited in dew, or float about in the form of clouds. If the temperature continues to fall, the vesicles of vapour that compose the cloud will increase in number, and begin to descend by their own weight. The largest of these falling fastest, will unite with the smaller ones they encounter in their descent, and thus drops of rain will be formed whose size will depend on the thickness and density of the cloud. The point to which the temperature of the air must be reduced in order to cause a portion of its vapour to form cloud or dew, is called the dew-point.

Hence, the law of aqueous precipitation may be stated: Whatever lowers the temperature of the air at any place below the dew-point, is a cause of rain. Various causes may conspire to effect this object, but it is chiefly brought about by the ascent of the air into the higher regions of the atmosphere, by which, being subjected to less pressure, it expands, and in doing so, its temperature falls. Ascending currents are caused by the heating of the earth's surface, for then the superincumbent air is also heated and consequently ascends by its levity. Air-currents are forced up into the higher parts of the atmosphere by colder, drier, and therefore heavier wind-currents getting beneath them, and thus wedgeways thrusting them upwards; and the same result is accomplished by ranges of mountains opposing their masses to the onward horizontal course of the winds, so that the air, being forced up their slopes, is cooled, and its vapour liberated in showers of rain or snow. Again, the temperature of the air is lowered, and the amount of the rainfall increased, by those winds which convey the air to higher latitudes. This occurs chiefly in temperate regions, or in those tracts traversed by the *return trade-winds*, which in the north temperate blow from the south-west, and in the south temperate zone, from the north-west. The meeting and mixing of winds of different temperatures is also known to produce rain, but not nearly to the extent at one time believed. It is also increased or diminished according as the prevailing winds arrive immediately from the sea, and are therefore moist, or have previously passed over large tracts of land, and particularly mountain ranges, and are therefore dry. Since the rainfall is evidently much modified by the temperature of the earth's surface over which the rain-producing winds blow, it follows that sandy deserts, by allowing solar and nocturnal radiation to take immediate effect in raising or depressing the temperature, and forests, by delaying, if not, in many cases, counteracting these effects of radiation, have each a peculiar influence on the rainfall.

Rain is the most capricious of all the meteorological phenomena, both as regards its frequency and the amount which falls in a given time. It rarely or never falls in certain places, which are, on this account, designated the rainless regions of the globe—the coast of Peru, in South America; the great valley of the rivers Columbia and Colorado, in North America; Sahara, in Africa; and the Desert of Cobi, in Asia, are examples; whilst, on the other hand, in such places as Patagonia, it rains almost every day. Again, the quantities which have been recorded at some places to have fallen at one time, are truly enormous. In Great Britain, if an inch fall in a day, it is considered a very heavy rain. In many parts of the Highlands of Scotland, three inches not unfrequently fall in one day. On the 5th of December 1863, there fell at Portree, in Skye, 12½ inches in 13 hours; and on the same day, 5·2 inches fell at Drishaig, near Loch Awe, where also, two days afterwards, 7·12 inches fell in 30 hours. At Seathwaite, in Borrowdale, 6·62 inches fell on November 27, 1845. But it is in continental, and especially tropical countries, where the heaviest single showers have been recorded. The following are a few of the most remarkable: At Joyeuse, in France, 31·17 inches fell in 22 hours; at Geneva, 30 inches in 24 hours; at Gibraltar, 33 inches in 26 hours; on the hills above Bombay, 24 inches in one night; and on the Khasia Hills, 30 inches on each of five successive days.

In all places within the tropics where the trade-winds are blowing regularly and steadily, rain is of rare occurrence, the reason being, that as these winds come from higher latitudes, their temperature is increasing; and hence they are in the condition of taking up moisture rather than of parting with it; and the return trade-winds, which blow above them in an opposite direction, having discharged the greater part of their moisture in the region of the calms, are also dry and cloudless. Where, however, these winds are forced up mountain-ranges in their course, as on the east of Hindustan, they bring rain, which falls chiefly during night, when the earth's surface is coolest. The region of calms is a broad intertropical belt about 5° in breadth, where the northern and southern trades (see TRADE-WINDS) meeting and opposing, mutually destroy each other, and thus produce a calm. This is the region of constant rains. Here the sun almost invariably rises in a clear sky; but about mid-day, clouds begin to gather; and in a short time, the whole face of the sky is covered with dense black clouds, which pour down prodigious quantities of rain. Towards evening, the clouds disappear, the sun sets in a clear sky, and the nights are serene and fine. The reason of this daily succession of phenomena in the belt of calms is, that there the air, being heated to a high degree by the vertical rays of the sun, ascends, drawing with it the whole mass of vapour which the trade-winds have brought with them, and which has been largely added to by the rapid evaporation from the belt of calms; this vapour is condensed as soon as it is raised to the line of junction of the lower and upper trade-winds, and the discharge is in some cases so copious, that fresh water has been collected from the surface of the sea. As evening sets in, the surface of the earth and the superincumbent air are cooled, the ascending currents cease, the cooled air descends, and the dew-point is consequently lowered, clouds are dissipated, and the sky continues clear till the returning heat of the following day brings round a recurrence of the same phenomena. Since the belt of calms, which determines the rainy season within the tropics, moves northward or southward with the sun's declination, carrying the trade-winds with it on each side, it follows that there will be only one rainy and one dry season in the year at its extreme northern and southern limits; but at all intermediate places, there will be two rainy and two dry seasons, at the equator these will be equally distant from each other.

This state of things is only of strict application to the Pacific Ocean, whose vast expanse of water, presenting a uniformly radiating and absorbing surface, is sufficient to allow the law to take full effect. But over the greater part of the earth's

surface disturbing influences draw the trade-winds more or less out of their normal course, and sometimes produce a total reversal, as in the case of the Monsoons (q. v.). These winds determine entirely the rainfall of India, and but for them, the eastern districts of Hindustan would be constantly deluged with rain, and the western parts constantly dry and arid. As it is, each part of South Asia has its dry and wet season, summer being the wet season of the western parts and interior as far as the Himalaya, and winter the wet season of the eastern, and especially south-eastern parts.

The heaviest annual rainfall on the globe is 600 inches on the Khasia Hills, about 500 inches of which falls in seven months during the south-west monsoons. This astonishing amount is due to the abruptness of the mountains which face the Bay of Bengal, from which they are separated by 200 miles of low swamps and marshes. The winds not only arrive among the hills heavily charged with the vapour they have absorbed from the wide expanse of the Indian Ocean, but being near the point of saturation, their temperature not being raised in passing over these swamps, they are, so to speak, ready to burst in torrents over the abrupt cliffs which divert them from their horizontal course into the higher regions of the atmosphere. At 20 miles inland, the annual fall is reduced to 200 inches; 30 miles further south, it is only 100 inches; north, at Gowadatty in Assam, it is only 80 inches. In the north-west of the Bay of Bengal, at Cuttack, it is only 50 inches; while in the north-east, in Arracan, owing to the south-west direction of the winds, it is 200 inches. At Madras, the annual fall is 45 inches; at Seringapatam, only 24 inches; at Bombay, 75 inches; at Uttra-Mullay, 263 inches, and at Mahabalishwar, 254 inches, both on the Western Ghauts; and at Poonah inland, 23 inches. The south-west monsoon discharges from 60 to 80 inches of rain over the parts of Hindustan not bounded by high mountains to the west, before reaching the Himalayas, after which it discharges the greater part of its moisture, 120 to 140 inches, on the outer Himalayan range, at elevations of 4000 to 8000 feet. Thus, four times more rain falls annually on the Khasia Hills than on the Himalaya, owing to the less abrupt face these latter mountains present to the south, to the sandy burning plain, which raise the winds considerably above the dew-point, and to the larger tract traversed by the winds, over which their moisture continues to be discharged as they pass.

The following are a few of the annual rainfalls in the tropics: Singapore, 97 inches; Canton, 78 inches; St Benoit (Isle of Bourbon), 163 inches; Sierra Leone, 87 inches; Caracas, 155 inches; Pernambuco, 106 inches; Rio Janeiro, 59 inches; Georgetown, 100 inches; Barbadoes, 72 inches; St Domingo, 107 inches; Bahamas, 52 inches; and Vera Cruz, 183 inches. In many places in the interior of continents within the tropics, the rainfall is small—not greater, in fact, than in temperate countries, such as the eastern parts of England. At Poona, only 23 inches fall annually.

The periodicity of the rainfall disappears as we recede from the tropics, and the times of the year during which it occurs are different—the greater quantity falling in summer at places within the tropics, but in winter in temperate regions. In respect of the rainfall, Europe may be divided into two distinct regions: Western Europe—extending, though in a modified form, into the interior of the continent—and the countries bordering on the Mediterranean. A vast ocean on the one hand, a great continent on the other, and a predominance of west winds, are the determining circumstances in the distribution of the rainfall over Western Europe. As the south-west winds, which are the return trades, descend and touch the earth's surface south of Europe, and as the whole of this continent is therefore within their influence, it follows that the western parts, especially where mountain-ranges stretch north and south, are rainy districts; for these mountains, diverting the south-west winds from their horizontal course, force them up into the higher regions of the atmosphere, where, chilled, they form into clouds, or deposit in rain the vapour they can no longer hold in suspension. Hence, the rainiest regions of Europe are Norway, Ireland, the west of Great Britain and of France, Spain, and Portugal. At the Stye, in the Lake District, 38·9 inches fell in January 1851; at Drishaig, 33·2 inches, and at Portree, 32·4 in December 1863; and in the same month, from 23 to 30 inches at many other places in the Scottish Highlands. In the west of Great Britain and Ireland, in the vicinity of high hills, the average rainfall is from 80 to 150 inches. At Bergen, in Norway, it is 89 inches; in the Peninsula, at Coimbra, it is 118 inches; at Oviedo, 74 inches; and at St Jago, 73 inches; and in France, it is 51 inches at Nantes, and 49 at Bayonne. At places at some distance from hills, and in more inland districts, the annual fall is much diminished. Thus, in the west of Great Britain, away from hills, it is from 30 to 45 inches; while in the east, it is from 20 to 28 inches. In France, it averages 30 inches; and in the plains of Germany and Russia, 20 inches; while in some parts of Sweden and Russia, it falls as low as 15 inches. In the interior of Europe, in mountainous districts, it rises much above these amounts; thus, at the Brocken, it is 59 inches. An important distinction between the mode of distribution of the rainfall in the west of Europe and that of more inland places is, that the greater part of the annual amount in the west falls in winter; whilst in the interior, this happens in summer. This difference is particularly striking on the different sides of Great Britain, and arises from this circumstance, that as the clouds are much lower in winter, they are arrested and drained of their moisture by the less elevated hills, leaving little to be deposited eastwards; but in summer, being high, they pass above, and discharge themselves in the interior. Thus, for every 10 inches of rain which fall at the following places in winter, there fall in summer respectively 8½ inches in the west of Great Britain, 11 inches in the east of Great Britain and west of France, 15 inches in the east of France, 20 inches in Germany, and 27 inches in the north and east of Russia.

The peculiarity of the rainfall of the basin of the Mediterranean depends on its proximity to the burning sands of Africa, a predominance of northerly winds, and the position of the Pyrenees and Spanish sierras to the west, on which the south-west winds discharge their rains before arriving on the north shores of the Mediterranean. In the valley of the Rhone, four times more rain falls in autumn than in summer; and south of the Alps, six times more rain falls with the north-east than with the south-west winds, being the reverse of what takes place in England. In Italy, the quantity diminishes as we approach the south. Along the Syrian and North African coasts, it rarely rains in summer, but frequently in winter. In the valley of the Rhone, the annual fall ranges from 20 inches at its mouth to 63 inches at St Rambert, the average being 30 inches. This is also the average of the valley of the Po; but on ascending to the Alps, it rises, as at Tolmezzo, to 96 inches.

The rainfall in the west of the American continent is distributed similarly to that of Europe—the amount being dependent on the physical

configuration of the surface over which the westerly winds blow. The yearly amount increases as we proceed northward; thus, at San Francisco it is 22 inches; at Fort Reading, 29 inches; at Fort Oxford, 72 inches; at Fort Vancouver, 47 inches; at Astoria, 86 inches; at Steilacoom (Wash. Ter.), 54 inches; and at Sitka, in Russian America, 90 inches.

But in the United States, the manner of the distribution of the rain is very different from that of Europe. The United States are dependent for their rain not on the Pacific Ocean, but on the Gulf of Mexico. There can be little doubt that, but for the high range of the Rocky Mountains in Central America, the greater part of the States would be an arid waste. These mountains are so high as to present an effectual barrier to the passage of the trade-winds, which blow over the Gulf of Mexico; they are, on this account, turned northward, and spread themselves over the States, especially over the low basin of the Mississippi. These winds being characterised by great heat, and loaded with much moisture from the warm waters of the Gulf of Mexico, tend to disturb the statical equilibrium of the atmosphere. When they have blown for some time, vast accumulations of heat and moisture take place, the equilibrium is destroyed, a great storm arises in consequence, sweeping eastward over the States, and in many cases crossing the Atlantic, and descending with violence on Western Europe. In the States, the southerly winds preceding the storm give place to the dry north-west winds, which rapidly clear the sky, and bring brilliant bracing weather in their train. It appears, in short, that the south winds from the Gulf of Mexico spread the moisture over the States, and the north-west wind disengages this moisture from them by getting below them, by their greater density, and thrusting them into the higher regions of the atmosphere. If this be the case, as the phenomena seem to warrant, then the heaviest rainfalls will be in the valleys, and the least on the higher grounds—a mode of distribution quite different from what prevails in Europe. And such is really the case, for the greatest amount of rain falls in Florida, the low flats of the Mississippi, then along its valley, and lastly in Iowa, or in that remarkable depression at the head of the river; and the least quantities on the Alleghanies, especially on their higher parts, and on the high grounds of the Missouri district. The following figures, giving the average annual amount in inches, shew this in a clear light: Pensacola, 57; Fort Brooke, 55; and Fort Pierce, 63—in Florida: Monroeville, 66; and Mobile, 64—in Alabama: Natchez, 58; Jackson, 53—in Mississippi: Rapides, 63; New Orleans, 52—in Louisiana: Savannah, 48—in Georgia: Nashville, 53—in Tennessee: Fort Madison, 50—in Iowa. At Athens, in Georgia, south of the Alleghanies, the amount is 36 inches; at Alexandria, in Virginia, also 36 inches; and at Jefferson, in Missouri, 38 inches. In the Northern States, the quantity diminishes at most places to between 27 and 45 inches, and the mode of its distribution becomes assimilated to that of Europe.

When raindrops fall through a stratum of air below 32°, they become frozen, and form *Hail* (q. v.). When the vesicles are formed in air under 32°, *Snow* (q. v.) is the result.

RAINBOW. The ordinary phenomena of the rainbow are usually visible on every occurrence of a 'sunny shower,' and we need not describe them particularly until we deduce them, one after another, from their cause. The most careless observation shews us that, for the production of a rainbow, we must have a luminous body of moderate angular diameter, and *drops* of water; for it is never seen except by direct sun or moon light, and never in a cloud unless rain be falling from it. Now, a falling drop of water takes, by its molecular forces, a *spherical* form. Also, as there is separation of the various colours of which white light is composed, the cause of the phenomenon must involve *Refraction* of Light (q. v.), because by Reflection (q. v.) these colours are not separated. But, again, the spectator who views the rainbow has his back to the sun, and rays of light merely refracted by a raindrop could not be thus sent back to the spectator. The phenomenon must therefore depend upon successive reflections and refractions, and we shall investigate in an elementary manner what appearances we ought to *expect* as the result of such processes according to the known laws of optics; merely premising that the fundamental points of the explanation were first given by Newton in the second book of his *Optics*.

First, then, let us consider what becomes of parallel rays of light, *of one colour* or refractive index (see REFRACTION), which are successively refracted and reflected in a single spherical raindrop.

For our immediate purpose, it is sufficient to suppose that the refractive index (see REFRACTION) of water is $\frac{4}{3}$; that is, the incident and refracted rays make with the perpendicular to the refracting surface of water, angles whose sines are in the ratio of 4 to 3.

Let the circle represent a section of the drop made by *any* plane passing through its centre O, and the line SO, which joins its centre with the

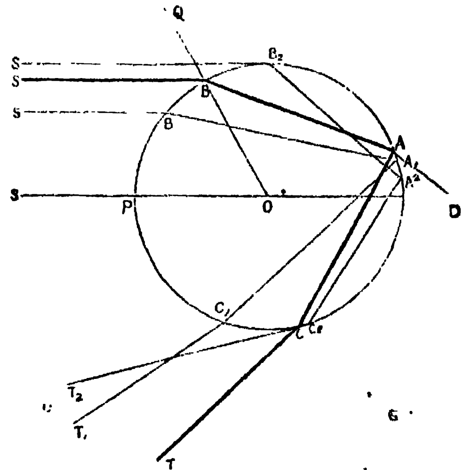


Fig 1.

sun; the sun being supposed, for the moment, to be a single luminous point, situated at so great a distance that lines drawn to it from different points of the drop are parallel. A ray of light, SB, falling on the drop in the plane of section will be, of course, partly reflected and partly refracted at B. The reflected part does not concern us, as in it all colours would travel together; and, in fact, the result of reflection from the external surfaces of the drops is simply to illuminate the background feebly. Join OB, and produce it to Q. Then the refracted ray (see REFRACTION) will have in the drop the direction BA, where the ratio of the sines of SBQ and OBA is the refractive index of water—i. e., 4 : 3 nearly. Arriving at A, the ray will be partly refracted in some such direction as AD, and the rest reflected in the direction AC. Now AD

obviously cannot fall on the eye of a spectator whose *back* is turned to the sun, and it has, therefore, nothing to do with the rainbow. The internally reflected ray, AC, on reaching the surface at C, is partly refracted in the direction CT (where BS and CT are symmetrically situated on opposite sides of OA), and partly reflected internally. The latter portion we must consider when we come to the cause of the *secondary*, or outer rainbow, the former is that which at present concerns us. Let SB_1, SB_2, be other incident rays. After a refraction, a reflection, and a second refraction, they emerge in the directions C_1T_1, C_2T_2, respectively. From the figure, which is drawn from calculation, it is obvious that both C_1T_1 and C_2T_2 are *less* inclined to OS than CT is. Hence for rays, parallel to SO, falling on the drop, and emerging after suffering two refractions and a reflection, the *final* direction is more and more inclined to SO, as the point of incidence, B_1, is further from P, at least up to some such point as B; after which (for points situated as B_2) it diminishes again. By proper mathematical methods, it is easy to find that the angle SOB is about 59° 24′, if the refractive index be $\frac{4}{3}$. Now, by a general property of maxima or minima in optics (see CAUSTIC), the rays falling on the drop near to B will emerge nearly parallel to CT; while those incident near any other point (as B_1) will be widely scattered at emergence. And we may evidently extend this reasoning to all other rays by supposing the above figure to rotate about the axis SO.

The conclusion is, therefore, that if homogeneous light fall in parallel lines on the spherical drop, those rays which have been *twice* refracted at the surface, and *once* internally reflected, will, on emergence, all lie within the cone formed by the revolution of CT about SO, and will be *condensed* towards the surface of that cone. Hence such an illuminated drop gives off by this particular process a solid cone of rays, much condensed towards its external boundaries.

So much for each drop. Next, let us inquire what the appearance will be to an eye in any given position. Referring to the next figure, in which

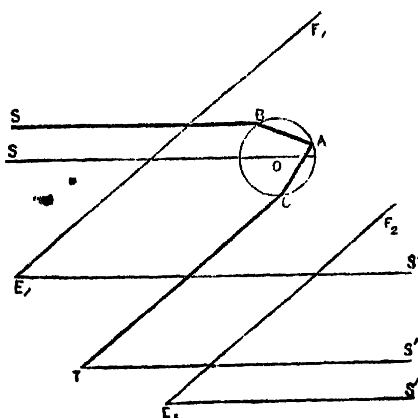


Fig 2.

the letters are the same as in the former, draw TS′ parallel to SO. Then TS′ is the direction of the line drawn to the point on the heavens diametrically opposite to the sun. So are E_1S_1' and E_2S_2', drawn from any assumed positions, E_1 and E_2, of the spectator's eye.

If the eye be placed in the surface of the cone just described, as at T, it will receive the condensed ray which emerges in the direction CT; if at E_1 (within the cone), it will receive diffused rays from the drop; if at E_2 (outside the cone), it will receive no light at all.

To put this in a simpler form: Draw E_1F_1 and E_2F_2 parallel to TC; then we may evidently say that the eye receives a condensed light from any drop whose angular distance from the point opposite the sun is CTS′, a diffused light if the angular distance be less than this, and none at all if it be greater. By methods already alluded to, it is found that CTS′ is nearly 42° 12′ for the index of refraction $\frac{4}{3}$.

Hence, if the sun were a luminous point, emitting homogeneous light, whose index of refraction in water is $\frac{4}{3}$, a spectator looking through a shower of falling raindrops towards the point immediately opposite to the sun, would see a bright circle of angular diameter 84° 24′ surrounding this point, diffused light within that circle, and darkness without it.

The effect of the finite angular diameter of the sun is evidently to widen this circle into a circular luminous band, whose breadth is the sun's apparent diameter, and whose mean radius is 42° 12′.

Next, let us consider the different refrangibilities of the coloured constituents of white light. The investigation above hinted at shews that the radius of the luminous circular band is greater, the less the refractive index; the proof, though very simple, would be out of place in this work. Hence the appearance actually observed with sunlight will be formed by the superposition of concentric, overlapping, circular bands, the radii being less and less as we consider the primary colours in the order from red to violet (see SPECTRUM). That is, we shall have a circular illuminated space, brightest towards the edge, with a homogeneous red ring as its external boundary, and a gradual mixture of the prismatic colours as we look nearer to the centre. This agrees very well with observation, and so do the calculated diameters of the external red (42° 22′) and internal violet (40° 35′) rings.

But what becomes of the light *twice* reflected inside the drop, and then refracted out? Let fig. 3 represent again a section of the drop, with sunlight falling on it in lines parallel to SO, and let us trace the course of one ray, as SB. The part reflected at B is to be disposed of as before; it goes

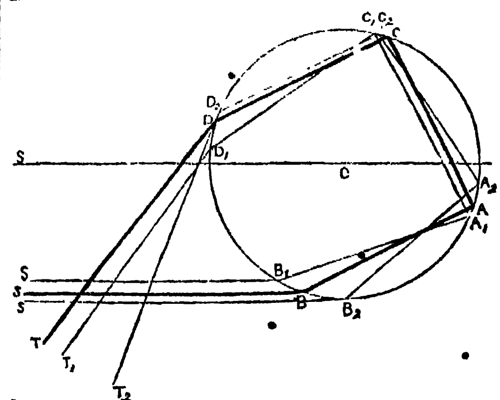


Fig. 3.

merely to illuminate, feebly, the otherwise dark background of cloud and vapour. The refracted portion proceeds, as before, to A, where part is reflected internally along AC, and part refracted out. The latter portion, as we have already seen, cannot possibly reach the eye of a spectator whose

back is turned to the sun. Similarly, at C, there is internal reflection along CD, and refraction out of the drop. The refracted part has already been considered, as the cause of the *primary* rainbow. The reflected part will again at D be separated into two; one, reflected internally, which proceeds to form the tertiary and higher orders of bow; and the other, escaping from the drop in the line DT, which goes to form the *secondary* bow. This we will consider with some care, because the secondary bow, though necessarily fainter than the primary, is usually seen; the tertiary and higher bows, each much fainter than the preceding one, since the beam inside the drop is weakened at each succeeding reflection, require no notice, as even the tertiary has never been observed in nature.

As before, we have traced the courses of two other beams, SB_1 and SB_2, in their passage to form part of the secondary bow. They are respectively $SB_1A_1C_1D_1T_1$ and $SB_2A_2C_2D_2T_2$; and the figure shews us that the final rays D_1T_1 and D_2T_2 are each *more* inclined to SO than DT is. There is, therefore, a particular ray, SB, whose final direction, DT, is *less* inclined to SO than that of any other ray which has suffered two refractions and two internal reflections; and, as before, the emergent light is condensed towards this minimum. If, then, the figure be made to revolve about SO, we see that DT will describe a cone, that *inside* this cone there is no refracted light, that towards the surface of the cone, part of the light is condensed, and that the rest of it is diffused through *exterior* space.

So much for one drop; let us now, as before, consider what will be seen by an eye in any position with regard to this particular drop. In fig. 4, the

Fig. 4.

letters denote the same things as in fig. 3. Hence if the eye be placed at T, it will receive the maximum of light, in a direction making an angle DTS′ with the point in the heavens opposite to the sun. If at E_1, it will receive some of the diffused light from a drop whose angular distance from the point opposite the sun is *greater* than DTS′; and if at E, it will receive no light at all, the drop's angular distance from the point opposite the sun being *less* than DTS′. Hence the appearance presented by a shower of drops is, for homogeneous light coming in parallel lines, a bright circle, whose angular radius is DTS′; diffused light outside that circle, and no light within it. When the light comes from a source of finite angular diameter, as the sun, the only effect is, as in the primary bow, to *widen* the bright circular band. When we consider the various components of white light, calculation shews us that DTS′ is least for red, and greatest for violet. Hence we have a series of concentric coloured bands superposed, their diameters increasing from the red to the violet. Hence the secondary rainbow has its inner edge red, and its outer violet; the intermediate space being an exceedingly mixed, or impure Spectrum (q. v.). The results of geometrical optics shew us that the angular diameter of the red is 100° 48′, and of the violet 106° 44′; so that the breadth of the bow is 3° 30′ nearly.

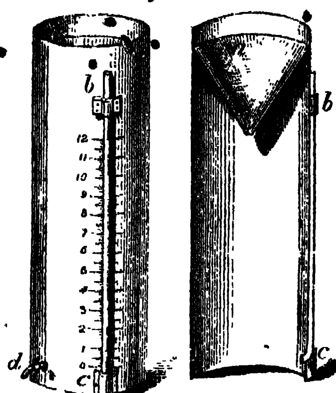
In nature, these rough results are pretty closely verified; but a more profound investigation into the circumstances of the problem shews us some modifications. In the first place, we find that for each kind of homogeneous light the actual maximum of brightness is in a circle of rather less angular diameter than that given by the more elementary investigation for the primary bow; and rather greater for the secondary. Secondly, and still with homogeneous light, there is a succession of feebler and feebler concentric circles of maximum brightness—inside the principal maximum in the primary bow, and outside it in the secondary. These give rise to what is always seen in a fine rainbow, the so-called *spurious* or *supernumerary* bows, lying close inside the violet of the primary bow, and outside that of the secondary. These are fainter and more impure as they proceed from the principal bow, and finally merge into the diffused white light inside the primary bow, and outside the secondary.

The angular dimensions of these bows, principal and spurious, were calculated from theory by Airy, and carefully measured by Miller in the artificial bow formed by passing light through a very fine column of water descending through a small aperture, and the accordance was perfect.

The lunar rainbow, which is a comparatively rare, but very beautiful phenomenon, differs from the solar simply in the source and intensity of the light by which it is produced; and, as in all cases of feeble light, the distinction of the colours is very difficult. In fact, except under the most favourable circumstances, the lunar rainbow rarely shews colours at all, giving a pale ghostly gleam of apparently white or yellow light.

RAIN-GAUGE. The use of rain-gauges is to ascertain the amount of rain which falls at any given place. They are of various constructions. The simplest is that which consists of a metallic cylinder, from the bottom of which, a glass tube (*bc*), divided into inches and parts of an inch, projects downwards. It is provided with a funnel, inserted within at the top, to prevent evaporation, and the rain-water is emptied out by means of a stop-cock (*d*) at the bottom, or, still simpler, by a hole (*a*) pierced in the funnel at the top. (See accompanying wood-cut.) As this form of gauge is objectionable on account of the frequent breakage of the glass-tube by frost, a float is used instead, which is raised by the water, and a scale is attached to it, to shew the quantity of rain received. As this gauge does not admit of very nice readings, another sort is frequently employed, viz., a receiving-vessel and a glass measure of much smaller diameter, which thus admits of as nice graduation as may be desired. As, practically, there is often great difficulty or trouble experienced in replacing the glass measure when it chances to get broken, the late G. V. Jagga Ráo, a wealthy zemindar of Vizagapatam, proposed a gauge in the form of a funnel having a diameter of 4·697 inches, or an area of 17·33 square inches. Now, as a fluid

ounce contains 1·733 cubic inches, it follows that for every fluid ounce collected by this gauge, the tenth of an inch of rain has fallen. This measure



Rain-gauge.

can, of course, be graduated to any degree of nicety, and may be reproduced at pleasure. It has also the great merit of being by far the cheapest gauge, costing only 4*s.* 6*d.* Self-registering rain-gauges have been invented by Osler and Crosley, but they are too expensive to come into common use.

A most important point with regard to the rain-gauge is its height above the ground. Mr Phillips found the fall of rain at York for 12 months in 1833—1834, to be 14·96 inches at a height of 213 feet from the ground; 19·85 inches at 44 feet; and 25·71 inches on the ground. This remarkable fact—viz., that different quantities are collected at different heights, the amount being always greater at the lower level, has been confirmed wherever the experiment has been made. No perfectly satisfactory account has yet been given of this singular phenomenon. The condensing of the vapour of the atmosphere on the surface of raindrops as they fall —the rebound of the finer particles into which many of the drops break themselves as they strike with violence on the ground—and the eddies and currents which prevail most and strongest around isolated objects raised above the surface of the ground, to a large extent account for the phenomenon. Of these three, the greatest weight is to be given to the last two; and this is confirmed by the fact, that a gauge placed on the roof of a building that happens to be flat, of considerable area, and with few or no chimney-stalks to disturb the air-currents, collects an amount equal to that collected at the same place by a gauge on the ground. The proper size and shape of the rain-gauge, and its height above the ground, so as to measure with the greatest exactness possible the real quantity of rain that falls, about all of which much diversity of opinion exists, are at present (1865) undergoing investigation by a series of extensive experiments conducted by Major Ward and Mr Symons, in Wilts; and by the Rev. J. Chadwick Bates, near Manchester.

RAIN-PRINTS, small pits observed on the surfaces of some argillaceous rocks, and believed to be the impressions of rain-drops. See ICHNOLOGY.

RAI'NY LAKE forms a portion of the boundary-line between British North America and the United States. It is situated 160 miles west of Lake Superior, is 1160 feet above sea-level, and is about 35 miles long, and 5 miles in average breadth. Its surplus waters are carried off to the Lake of the Woods, in a west-north-west direction, by the Rainy River, which is about 100 miles in length, and the banks of which are covered with pine-forests.

RAISED SEA-BEACHES. See BEACHES, RAISED.

RAISINÉE, a *rob*, or sweetmeat, much esteemed in France, made by boiling new wine, and skimming until only half the quantity of wine remains; after which it is strained; apples, pared and cut into quarters, are added to it, and it is allowed to simmer gently, till the apples are thoroughly mixed with the wine, when it has a very pleasant sweetish acid taste. Cider may be used instead of wine.

RAISINS are dried grapes, prepared by two different methods. The one method consists in partially cutting through the stalk of the ripened bunches, and allowing them to shrink and dry upon the vine by the heat of the sun. These are by far the better sort, and are called *Raisins of the Sun*, or Muscatels. Malaga is much celebrated for its sun-raisins, which are the finest in the world. The raisins prepared by the other method are called *Lexias*, and are gathered and hung on lines, or laid on prepared floors to dry in the sun. When dried, they are dipped in a hot *lye*, made by dissolving the alkali out of wood-ashes or barilla with water, until the filtered fluid has a specific gravity of about 1·100; to this is added, for every four gallons, a pint of olive oil and a quarter of a pound of salt. After dipping, the fruit is laid on hurdles of wicker-work to drain, and is continually exposed to the sun for about a fortnight. The raisins are then pulled from the stalks, and packed into boxes for transport to other countries. The qualities best known in the markets are Valencias and Denias from Spain, Malagas from Malaga, and black Smyrnas and Sultanas from Asiatic Turkey. The Currant (q. v.), or Corinth, as it was originally called, is only a small variety of grape peculiar to the Greek Islands, cured in the same way, and in itself forming a large staple of those islands. Britain imports of raisins proper nearly 5000 tons, and quite as great a quantity of currants in addition.

RÂJAH, or more correctly **RÂJÂ** (from the Sanscrit *râjan*, king, cognate with the Latin *reg* of *rex*), is originally a title which belonged to those princes of Hindu race who, either as independent sovereigns or as feudatories, governed a territory; it then, however, became a title given by the native governments, and, in later times, by the British government to Hindus of rank, and it is now not uncommonly assumed by the zemindars or land-holders; the title Mahârâjah, or 'great Râjah,' being, in these days, generally reserved to the more or less independent native princes. According to the ancient social system of India, the râjah belonged to the kshattriya or military caste (see CASTE); now, however, the title is given to, and assumed by, members also of an inferior caste.

RA'JAMAHE'NDRI, or **RAJAMUNDRY**, a town of Hindustan, capital of a collectorate of the same name in the presidency of Madras, stands on the left bank of the Godavari, about 60 miles from the mouth of that river, and in long. 81° 53′ E. To the north of the town is the Fort, a square edifice, comprising the barracks, hospital, jail, and magazine. The nobler kind of game, as well as wild-fowl of all sort, abounds in the vicinity, and the situation and scenery are in the highest degree beautiful. The Godavari is here about two miles wide, and is crossed by a steam-ferry. Napkins, table-cloths, and drills are manufactured. Pop. 15,000, about a fourth of whom are Brahmans. Of the collectorate of R., the area is

6050 square miles, and the population upwards of 1,000,000.

RÂJATARANGIN'Î (or 'the river of kings,' from the Sanscrit *râjan*, king, and *tarangin'î*, a river or stream) is the name of four chronicles of the history of Cashmir written in Sanscrit verse; the first by *Kalhan'a*, bringing the history of Cashmir till about 1148 after Christ; the second, a continuation of the former, by *Jonarâja*, to 1412; the third, a continuation of the second, by *S'rîvara*, a pupil of Jonarâja, to 1477; and the fourth, by *Prâjyabhat't'a*, from that date to the conquest of the valley by the Emperor Akber. Amongst these chronicles, however, it is especially the first which has earned a great reputation, inasmuch as it is the most important and the completest of all *known* Hindu chronicles, and, for this reason, may be considered as the only surviving work of Sanscrit literature which betrays an attempt at historiography. The author of the work, the Pandit Kalhan'a—of whom we merely know that he was the son of Champaka, and lived about 1150, under the reign of Sinhadeva of Cashmir—reports that before entering on his task, he had studied eleven historical works written previously to his time, and also a history of Cashmir by the sage Nila, which seems to be the oldest of all; but that, not yet contented with these sources of information alone, he had also examined old documents, such as grants and proclamations made by kings, texts of laws, and sacred books. It may be presumed, therefore, that Kalhan'a had not merely the desire, but set honestly to work to elucidate the history of Cashmir up to his date. And so far as the last few centuries preceding him are concerned, it is possible that the facts narrated by him are reliable; but owing to the uncritical disposition of the Hindu mind in all matters that regard historical facts, those especially of a more or less religious or legendary character, and also to his bias to produce a consistent system of chronology, great doubts must attach to all that relates in his work to the ancient history of India. In spite of these shortcomings, however, which are more those of the nation to which the author belonged, than those of the individual himself, much that is reported by Kalhan'a is the only source of information we have of the history of Cashmir, and much very valuable as coming from an indigenous source. Kalhan'a begins his work, as may be expected, with the mythological history of the country; the first king named by him is Gonarda, who, according to his chronology, would have reigned in the year 2448 before Christ; and the last mentioned by him is Sinhadeva, about 1150 after Christ. The Sanscrit text of the complete work, together with that of the three other Râjatarangin'îs, which is of little extent, has been edited at Calcutta, 1835, under the auspices of the General Committee of Public Instruction and the Asiatic Society of Bengal. Six sections of it have been edited, with notes, and learned appendixes, in French, by A. Troyer, who likewise translated into French these sections, as well as the remaining two (*Râdjatarangini, Histoire des Rois du Kachmir*, &c., vols. 1—3, Paris, 1840—1852).—See also H. H. Wilson, *An Essay on the Hindu History of Cashmir*, in the *Asiatic Researches*, vol. xv., and Lassen's *Indische Alterthumskunde*, vols. i. and ii.

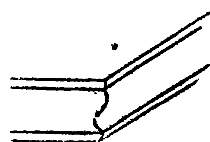
RAJMAHA'L, a town of India, in the British district of Bhaugulpore, presidency of Bengal, and a station on the line of railway from Calcutta to the north-west frontier, stands on a steep eminence on the right bank of the Ganges, 200 miles by land north-north-west of Calcutta. Its position is advantageous, and it was long the chief town of the Bengal and Bahar provinces. Since the removal of the British courts of justice, however, its prosperity has declined. It now presents a deserted and ruinous appearance, but is still noteworthy for the remains of its once splendid palace, and for its important transit-trade. It contains twelve market-places, and has about 30,000 inhabitants, most of whom are employed in providing for the wants of the vast number of travellers who pass through the town by land and water.

RÂJPOOTS, or **RÂJPUTS** (from the Sanscrit *râjan*, king, and *putra*, son; hence literally, 'sons of kings'), is the name of various tribes in India which are of Aryan origin, and either descended from the old royal races of the Hindus, or from their Kshattriya or warrior caste (see CASTE). At all periods, they seem to have played a conspicuous part in the history of India; and all over Hindustan there are many families who, rightly or wrongly, claim the title of Râjputs. At present, they occupy chiefly the country known as Râjasthân or Râjputana, including, amongst other states, those of Mewar, Marwar, Jeypur, Bikanir, Jessulmir, Kotah, and Bundi. Before the invasion of Mahmud the Ghiznevide, four great kingdoms were under the dominion of Râjput families—viz., Delhi, Kanoj, Mewar, and Anhulvarra; and all the kings mentioned in the *Râjatarangin'î* (q. v.) of Kalhan'a were of Râjput origin.—For the history, &c., of the R., and the geography of Râjputana, see Colonel James Tod's *Annals and Antiquities of Râjasthân, or the Central and Western Râjpoot States in India* (2 vols., Lond. 1829); Ritter's *Erdkunde*, vol. vi. pp. 724, ff.; Lassen's *Indische Alterthumskunde*, vols. i. and ii. (*passim*); A. Troyer's *Râdjatarangin'î*, vol. iii. (*Eclaircissements historiques*, &c.).

RAKE, an agricultural and horticultural implement, in use from very ancient times. In its simplest form it consists merely of a bar of wood or iron, with wooden or iron teeth inserted into it, and attached at right angles across the end of a long handle. It is used for collecting straws, &c., from a field after it has been reaped or mown, or stones from newly-tilled ground, sometimes also in gardens, for covering seeds. A long rake, with a short triangular framework instead of a handle, and curved teeth, is much used in hayfields in England, and is known as the *ell-rake*. Rakes are also adapted for being drawn by horses; and there are many modifications both of the hand-rake and the horse-rake.

RAKE, in Naval Language, has more than one meaning. The rake of a ship's stern or bow is the length to which the keel would have to be prolonged to bring it under the most projecting point of the stern or bow. Raking masts are masts set aslope, so that the angle they make with the keel towards the stern is less than a right angle, as in a brigantine. To rake a ship is to bring guns to bear so as to fire them along her deck from end to end; this is the most disastrous thing that can happen to a vessel in action, and it is the object of all good seamanship to avoid it. When a ship is raked at short range, grape can be used with great and fatal effect.

RAKING MOULDING, a moulding not horizontal or vertical, but sloping at an angle. When joined to a horizontal moulding, the raking moulding is run so as to mitre with the true vertical profile of the former, and is therefore different from it in section.



Raking Moulding.

RAKO'CZYMARSCH, a simple but grand military air by an unknown composer, said to have been the favourite march of Francis Rako'czy II. of Transylvania, and at all events much played in his army. The Magyar-Hungarians adopted it as their national march, and in 1848 and 1849, it has been alleged to have had the same inspiriting effect on the revolutionary troops of Hungary as the *Marseillaise* on the French. Like the *Marseillaise* in France, it has been placed under the ban of the Austrian government at various periods of political excitement. In 1848, several attempts were made by Hungarian poets to set it to appropriate verses, but without much success. The air most generally known in Germany and elsewhere out of Hungary as the Rako'czymarsch, which is introduced by Hector Berlioz in his *Damnation de Faust*, is a weak paraphrase of the original by Ruziska.

RAKSHAS, or RÂKSHASA, is, in Hindu Mythology, the name of a class of evil spirits or demons, who are sometimes imagined as attendants on Kuvera, the god of riches, and guardians of his treasures, but more frequently as mischievous, cruel, and hideous monsters, haunting cemeteries, devouring human beings, and ever ready to oppose the gods and to disturb pious people. They have the power of assuming any shape at will, and their strength increases towards the evening twilight. Several of them are described as having many heads and arms (see, for instance, RÂVANA), large teeth, red hair, and, in general, as being of repulsive appearance; others, however, especially the females of this class, could also take beautiful forms in order to allure their victims. In the legends of the *Mahâbhârata*, *Râmâyana*, and the *Purân'as*, they play an important part, embodying, as it were, at the period of these compositions, the evil principle on earth, as opposed to all that is physically or morally good. In the *Purân'as*, they are sometimes mentioned as the offspring of the patriarch Pulastya, at other times as the sons of the patriarch Kas'yapa. Another account of their origin, given in the *Vishn'u-Purân'a*, where, treating of the creation of the world (book i. chap. v.), is the following: 'Next, from Brahmâ, in a form composed of the quality of foulness, was produced hunger, of whom anger was born; and the god put forth in darkness beings emaciate with hunger, of hideous aspects, and with long beards. Those beings hastened to the deity. Such of them as exclaimed: "Not so, oh! let him be saved," were named Râkshasa (from *raksh*, save); others who cried out: "Let us eat," were denominated, from that expression, Yaksha' (from *yaksh*, for *jaksh*, eat). This popular etymology of the name, however, would be at variance with the cruel nature of these beings, and it seems, therefore, to have been improved upon in the *Bhâgavata-Purân'a*, where it is related that Brahmâ transformed himself into night, invested with a body; this the Yakshas (q. v.) and Râkshasas seized upon, exclaiming: 'Do not spare it—devour it!' when Brahmâ cried out: 'Don't devour me (*mâ mâm jakshata*)—spare me! (*rakshata*).' (See F. E. Hall's note to Wilson's *Vishn'u-Purân'a*, vol. i. page 82.) The more probable origin of the word *Rakshas*—kindred with the German *Recke* or *Riese*—is that from a radical *r'ish* or *rish*, hurt or destroy, with an affix *sas*; hence, literally, the destructive being.

RALEIGH, SIR WALTER, the son of Walter Raleigh of Fardel in Devonshire, was born in 1552 at Hayes, on the coast of that county. In 1568, he was sent to Oxford as a commoner of Oriel College, and though his residence there was brief, gave token of remarkable ability. Only the year after, relinquishing study for adventure, he went to France as volunteer in an expedition in aid of the Huguenots; and some years subsequently we find him serving in the Low Countries in a force sent by Queen Elizabeth to assist the Dutch in their patriotic struggle against the Spaniards. Of this earlier part of his career, nothing specially remarkable is recorded. In 1579, he made his first venture in the field of activity which through life continued at intervals to attract him, sailing, in conjunction with his half-brother, Sir Humphrey Gilbert, with the purpose of founding a colony in North America. The expedition proved unsuccessful, being roughly handled by a Spanish force, and obliged to return in somewhat evil case. During the year following, R. held a captain's commission in Ireland, where, in operations against the rebels, he distinguished himself by his courage and conduct. Shortly after his return, he seems first to have attracted the notice of Queen Elizabeth, with whom he speedily rose high in favour. The story which attributes the commencement of his relations with her to his graceful gallantry in spreading before her his costly mantle as a carpet, is so well known, that it need only be glanced at in passing. For some years forward, he was constant in his attendance upon the queen, who distinguished him by employing him from time to time in various delicate offices of trust, and by substantial marks of her favour. The spirit of enterprise was, however, restless in the man; and in 1584, a patent having been granted him to take possession of lands to be discovered by him on the continent of North America, he fitted out two ships at his own expense, and shortly achieved the discovery and occupation of the territory known as Virginia, a name chosen as containing an allusion to the 'Virgin-queen' herself. Elizabeth also conferred on R. the honour of knighthood. If we except the questionable benefit—with which R.'s name remains connected—of the introduction of tobacco into Europe, no immediate good came of the colony; and after some years of struggle, during which he sent out several auxiliary expeditions, he was forced to relinquish his connection with it.

During the years 1587—1588, the country being menaced by a Spanish invasion, R. was actively and responsibly occupied in organising a resistance, and held command of the queen's forces in Cornwall. In the latter year, he shared with new access of honour in the series of actions which ended in the defeat and dispersion of the great Armada, and was thanked and rewarded for his services. Shortly after (1593), in consequence of an intrigue, resulting in his private marriage with Elizabeth Throckmorton, one of the queen's maids of honour, he incurred her majesty's severe, but only temporary, displeasure. In his banishment from court, he recurred to those schemes of conquest and adventure in the New World which formed one main dream of his life; and, in 1595, headed an expedition to Guiana, having for its object the discovery of the fabled El Dorado, a city of gold and gems, the existence of which in these regions was then generally believed in. Of this brilliant but fruitless adventure, on returning, he published an account. Having been reinstated in the royal favour, he held in 1596 the post of admiral in the expedition against Cadiz, commanded by Howard and the Earl of Essex, and was admittedly the main instrument of its success. Also, in the year following, he took part in the attack on the Azores made by the same commanders. In the court intrigues which ended in the downfall of the Earl of Essex, he after this became deeply involved; and certain points of his conduct, as notably the sale of his good offices with the queen in behalf of such of the earl's

adherents as would buy them, though easily regarded by the current morality of the time, have fixed somewhat of a stain on a fame otherwise so splendid.

With the death of Elizabeth in 1603 ends the brilliant and successful portion of R.'s career. Her successor, James, from the first regarded him with a suspicion and dislike which he was at no pains to conceal. He had besides made powerful enemies—the principal of whom were Cecil and Howard. His ruin was resolved on, and means were soon found to compass it. He was accused of complicity in a plot against the king; and though no jot of evidence of his being any way concerned in it was produced at his trial, a verdict was readily procured, finding him guilty of high treason. The language of the prosecutor, Attorney-general Coke, was outrageously abusive. He called R. 'a damnable atheist,' 'a spider of hell,' a 'viperous traitor,' &c. Sentence of death was passed, but James did not venture to execute him; and he was sent to the Tower, where, for thirteen years, he remained a prisoner, his estates being confiscated, and made over to the king's favourite, Carr, subsequently Earl of Somerset. During his imprisonment, he devoted himself to literary and scientific pursuits, his chief monument in this kind being his *History of the World*, a noble fragment, still notable to the student as one of the finest models of our quaint and stately old English style. Certain of his poetical pieces, giving hint of a genius at once elegant and sententious, also continue to be remembered, and are more or less familiar to every one. In 1615, he procured his release, and once more sailed for Guiana. The expedition, from which great results were expected, failed miserably. R. himself, in consequence of severe illness, was unable to accompany it inland; and nothing but disaster ensued. To add to his grief and disappointment, his eldest and favourite son was killed in the storming of the Spanish town of St Thomas, and he returned to England, broken in spirit and in fortunes. He returned only to die. On the morning of the 29th October 1618, in the sixty-sixth year of his age, he was infamously executed, nominally on the sentence passed on him sixteen years before, but really, there is reason to suppose, in base compliance on James's part with the urgencies of the king of Spain, who resented his persistent hostility.

R. was a man of noble presence, of versatile and commanding genius, unquestionably one of the most splendid figures in a time unusually prolific of all splendid developments of humanity. In the art and finesse of the courtier, the politic wisdom of the statesman, and the skilful daring of the warrior, he was almost alike pre-eminent. The moral elevation of the man shone out eminently in the darkness which beset his later fortunes; and the calm and manly dignity with which he fronted adverse fate conciliated even those whom his haughtiness in prosperity had offended. R.'s 'Life' has been written by Oldys, Cayley (2 vols., Lond. 1806), and P. F. Tytler (Edin. 1833); his poems were collected and published by Sir E. Brydges (Lond. 1814); his *Miscellaneous Writings*, by Dr Birch (2 vols. 1751), and his *Complete Works*, at Oxford (8 vols. 1829).

RA'LEIGH, the capital of North Carolina, is six miles west of the Neuse River, near the centre of the state; lat. 35° 47′ N., long. 78° 48′ W. The town is regularly built on an elevated site, with a central park, containing a large domed state-house, and broad streets. It contains a court-house, jail, 2 banks, 9 newspapers, 5 churches, deaf and dumb and lunatic asylums, and extensive railway connections. Pop. (1860), 4780.

RALLENTA'NDO (Ital., becoming slower), a musical term, abbreviated *rallent.*, or *rall.*, indicating a gradual relaxing or diminution of time.

RA'LLIDÆ, a family of birds of the order *Grallæ*, characterised by a long bill, which is more or less curved at the tip and compressed at the sides, the nostrils in a membranous groove, the wings of moderate length, the tail short, the legs and toes long and slender, the hind-toe placed on a level with the others. To this family belong rails, crakes, gallinules, coots, &c. The toes of some, as coots, are margined with a lobed membrane; but these are by some ornithologists separated from this family (see COOT). Even those R. of which the toes have no marginal membrane, are fitted, by the length of their toes, for walking on mud or ooze. Many of them swim and dive well. Most of them are aquatic, or frequent either fresh-water or salt marshes; but some, as the crakes, are found in dry situations.

RÂMA is, in Hindu Mythology, the name common to three incarnations of Vishn'u, of Paras'urâma, Râmachandra, and Balarâma. See VISHN'U.

RA'MADAN, the ninth month in the Mohammedan year. In it Mohammed received his first revelation, and every believer is therefore enjoined to keep a strict fast throughout its entire course, from the dawn—when a white thread can be distinguished from a black thread—to sunset. Eating, drinking, smoking, bathing, smelling perfumes, and other bodily enjoyments, even swallowing one's spittle, are strictly prohibited during that period. Even when obliged to take medicine, the Moslem must make some kind of amends for it, such as spending a certain sum of money upon the poor. During the night, however, the most necessary wants may be satisfied—a permission which, practically, is interpreted by a profuse indulgence in all sorts of enjoyments. The fast of R., now much less observed than in former times, is sometimes a very severe affliction upon the orthodox, particularly when the month—the year being lunar—happens to fall in the long and hot days of midsummer. The sick, travellers, and soldiers in time of war, are temporarily released from this duty, but they have to fast an equal number of days at a subsequent period, when this impediment is removed. Nurses, pregnant women, and those to whom it might prove really injurious, are expressly exempt from fasting. We may add, that according to some traditions (Al-Beidâwi), not only Mohammed, but also Abraham, Moses, and Jesus received their respective revelations during this month. The principal passages treating of the fast of R. are found in the second Surah of the Koran, called 'The Cow.'

RÂMÂYAN'A is the name of one of the two great epic poems of ancient India (for the other, see the article MAHÂBHÂRATA). Its subject-matter is the history of Râma, one of the incarnations of Vishn'u (q. v., and see RÂMA), and its reputed author is *Valmiki*, who is said to have taught his poem to the two sons of Râma, the hero of the history; and, according to this legend, would have been a contemporary of Râma himself. But though this latter account is open to much doubt, it seems certain that Valmiki—unlike Vyâsa (q. v.), the supposed compiler of the *Mahâbhârata*—was a real personage; and, moreover, that the R. was the work of one single poet—not like the *Mahâbhârata*, the creation of various epochs and different minds. As a poetical composition, the R. is therefore far superior to the *Mahâbhârata;* and it may be called the best great poem of ancient India, fairly claiming a rank in the literature of the world equal to

that of the epic poetry of Homer. Whereas the character of the *Mahâbhârata* is cyclopædical, its main subject-matter overgrown by episodes of the most diversified nature, its diction differing in merit, both from a poetical and grammatical point of view, according to the ages that worked at its completion—the R. has but one object in view, the history of Râma. Its episodes are rare, and restricted to the early portion of the work, and its poetical diction betrays throughout the same finish and the same poetical genius. Nor can there be any reasonable doubt as to the relative ages of both poems, provided that we look upon the *Mahâbhârata* in the form in which it is preserved, as a whole. Whether we apply as a test the aspect of the religious life, or the geographical and other knowledge displayed in the one and the other work, the R. appears as the older of the two. Since it is the chief source whence our information of the Râma incarnation of Vishn'u is derived, its contents may be gathered from that portion of the article VISHN'U which relates to *Râmachandra*. The R. contains (professedly) 24,000 epic verses, or *S'lokas*, in seven books, or *Kân'd'as*, called the *Bâla-*, *Ayodhyâ-*, *Aran'ya-*, *Kishkindhâ-*, *Sundara-*, *Yuddha-* (or *Lankâ-*), and *Uttara-Kân'd'a*. The text which has come down to us exhibits, in different sets of manuscripts, such considerable discrepancies, that it becomes necessary to speak of two recensions in which it now exists. This remarkable fact was first made known by A. W. von Schlegel, who, in Europe, was the first who attempted a critical edition of this poem; it is now fully corroborated by a comparison that may be made between the printed editions of both texts. The one is more concise in its diction, and has less tendency than the other to that kind of descriptive enlargement of facts and sentiments which characterises the later poetry of India; it often also exhibits grammatical forms and peculiarities of an archaic stamp, where the other studiously avoids that which must have appeared to its editors in the light of a grammatical difficulty. In short, there can be little doubt that the former is the older and more genuine, and the latter the more recent, and, in some respect, more spurious text. A complete edition of the older text, with two commentaries, was published at Madras in 1856 (in the Telugu characters, vol. i.—iii.); another edition of the same text, with a short commentary, appeared at Calcutta in two vols. (1860), and a more careful and elegant one at Bombay (1861). Of the later edition, Signor Gaspare Gorresio has edited the first six books (vol. i.—v., Paris, 1843—1850) without a commentary, but with an Italian, somewhat free, translation in poetical prose (vol. vi.—x., Paris, 1847—1858). Former attempts at an edition and translation of the R. remained unfortunately incomplete. The earliest was that made by William Carey and Joshua Marshman, who edited the first two books, and added to the text a prose translation in English and explanatary notes (vol. i.—iii., Serampore, 1806—1810; and vol. i., containing the first book, Dunstable, 1808). Another edition, of an eclectic nature, is that by A. W. von Schlegel; it contains the first two books of the text, and an excellent Latin translation of the first book and twenty chapters of the second (vol. i., parts 1 and 2, and vol. ii. part 1, Bonn, 1846). Various episodes from the R., it may also be added, have at various times occupied sundry editors and translators.

RA'MBLA, a small town of Spain, in the modern province of Cordova, and 23 miles south of the city of that name, stands on a hill in a district which produces abundantly grain, wine, and oil. Some manufactures of coarse pottery, especially of porous water-coolers, are carried on. Pop. 6500.

RAMBOUILLET, CATHERINE, MARQUISE DE, one of the most accomplished and illustrious women of the 17th c., was born at Rome, of Italian parents, in 1588, and received a refined education under the superintendence of her mother, the Marchese di Pisani. At the age of 12, she was betrothed to a French nobleman, Charles d'Angennes, son of the Marquis de Rambouillet, who succeeded to the family estates and title on the death of his father in 1611. When the youthful marquise first appeared in the assemblies at the Louvre, she was shocked by the gross corruption of morals and manners that prevailed among the mob of courtiers, and almost immediately conceived the idea of forming a select circle for herself, which should meet at her own house—the famous Hôtel de Rambouillet. Madame de R. was admirably fitted for presiding at the reunions which have made her name famous in the literary history of France. Handsome and gracious, but free from coquetry and all personal pretensions, her affability, generosity, and steadfast attachment to her friends, made her an object almost of worship to those who enjoyed her society. The writers of that epoch are unanimous in the expression of their homage. The characteristic feature of the Rambouillet circle was the intercourse, on terms of equality, of the aristocracy of rank and the aristocracy of genius. *There*, for the first time, do we meet with a generous and adequate recognition of the dignity of letters. For fifty years the *salons* of the marquise were hospitably open to the wits, critics, scholars, and poets of Paris, beginning with Malherbe and Racan, followed by that distinguished circle of *beaux esprits* who contributed so much to the formation of the French language and taste—Costar, Sarrazin, Conrart, Patru, Balzac, Segrais, Godeau, Voiture, and Corneille; and closing with the generation who filled up the interregnum from Corneille to Molière, Scarron, Saint-Evremond, Benserade, the Duc de Larochefoucauld, &c. Many of the literary débuts of celebrated geniuses were made at the Hôtel de Rambouillet. Here Corneille read his first piece, *Mélite*, and Armand du Plessis, afterwards Cardinal Richelieu, sustained a *Thèse d'Amour*, and Boileau preached one of his earliest sermons. But the Hôtel was almost as much renowned for the brilliant and accomplished women who frequented it, as for its crowd of professional littérateurs. The names of Mademoiselle de Scudéry, of Mademoiselle Coligny—afterwards Comtesse de la Suze—and of the Marquise de Sablé, who inspired the *Maximes* of Larochefoucauld, are among the most distinguished of their time and country; but above them all, as conspicuous by her splendid beauty as by her faultless grace of manner, the centre and idol of both sexes, shone the sister of the great Condé, and the heroine of the Fronde—the Duchesse de Longueville. The combined influence of so many different sorts of *esprit* exercised a profound and lasting influence on the literature and society of the 17th c., and is considered—rightly, as we think—to have developed quite a new art—that of lively, polished conversation, in which France has ever since taken the lead, and has thus placed itself socially in the front of European civilisation. It has been customary to say that the *Précieuses Ridicules* of Molière was aimed at the foibles of the Rambouillet coterie. But this notion has been shewn to be entirely groundless. The *Précieuses Ridicules* was actually first performed at the Hôtel, and Molière, in the preface to his *Femmes Savantes*, protests against the supposition that he meant to reflect on a circle which he affirmed had every claim to respect. It appears from investigation, that grotesque imitations of the manners and style of the Hôtel had, in the course

of years, become prevalent both in Paris and the provinces, and that it was these, and not their charming prototype, which were exposed to the satire of Molière. Madame de R. died at Paris, 2nd December, 1665.—See Röderer's *Mémoire pour servir à l'Histoire de la Société polie en France pendant le dix-septième Siècle*; and Victor Cousin's *Jeunesse de Mde. de Longueville, Mde. de Sablé, &c.*

RAMEAU, Jean Philippe, an eminent French musician, born at Dijon, in 1683, and son of the organist of the Sainte Chapelle there. He shewed a genius for music almost from infancy, and with the view of devoting himself to it as a profession, set out for Italy at the age of 18, but proceeded no further than Milan. After travelling through France, and acquiring a considerable reputation as a performer on the organ, he was appointed organist of the cathedral of Clermont, in Auvergne, and wrote while there his *Traité de l'Harmonie*, a work of some note in musical literature, which was published in Paris in 1722. Removing to Paris, he became organist of Sainte Croix de la Bretonnerie, and published various other treatises connected with the theory of music. In 1733, at the mature age of 50, he produced his first opera, *Hippolyte et Aricie*, the drama of which was written by the Abbé Pellegrin. It created a great sensation, and R. was forthwith elevated to the position of a rival to Lulli as an opera composer, musicians being divided in their partisanship of the two artists. R.'s best opera was *Castor et Pollux*, produced at the Académie Royale de Musique, in 1737; it contains one chorus which has hardly been surpassed in the whole range of theatrical music. Between 1733 and 1760, he composed 21 operas and ballets, as well as numerous harpsichord pieces. His works on harmony acquired for him a deservedly high reputation as a musical theorist; he has been called the Newton of musical science. Louis XV. created for him the office of Cabinet Composer, granted him letters of nobility, and named him a Chevalier de St Michel. R. died in 1764.

RAMESSES, RAMESES, or RAMSES, the name of several Egyptian monarchs, some of whom were known to the Greek and Roman writers and the chronologists; the name signifies 'born of the sun' or the 'nascent sun.' The R. family is supposed to have been of Theban origin, and to have been descended from one of the later queens of the 18th dynasty. The exploits of R. are confounded by the Greek and Roman authors with those of Sesostris (see Sesostris), and mingled in the legend of Armais, the Danaus of the Greeks. R. is said to have had a great army and navy, and at the head of a force of 700,000 men, to have conquered Ethiopia, Libya, Persia, and other eastern nations. Before leaving his kingdom for these distant expeditions, he is said to have appointed his brother Armais or Danaus regent of the kingdom, charging him neither to assume the diadem, nor interfere with the royal harem. R. then proceeded to conquer Cyprus, Phœnicia, the Assyrians and Medes. Armais contravened his orders; and R., informed of this by the high priest, suddenly returned to Pelusium, and resumed the kingdom, expelling his brother, who, fleeing with his daughters, the Danaids, to Argos, established himself in Greece. According to the Roman authors, however, Troy was taken in the reign of Rameses. The walls of the temples of Thebes were said to be covered with inscriptions and scenes recording his conquests and the tributes rendered to him, and these were interpreted to Germanicus by the priests on his visit to Egypt. Such is the account given of a monarch called R. by the classical authors. The following are the principal princes and monarchs of this name, found on the monuments of Egypt. 1. A prince or king represented with the royal families of the 18th dynasty in a sepulchre at Thebes.—2. R. I., chief of the 19th dynasty, who reigned but a short time, and whose name is found on the monuments of Thebes and the Wady Halfa.—3. R. II., or Great, who mounted the throne at a very early age, conquered the Khita or Hittites, and other confederate nations of Central Asia, in his 7th year, and concluded an extraditionary treaty with the Khita in his 21st year. Other nations, European and African, fell under his sway, and his empire extended far south in Nubia, the ancient Ethiopia, which he governed by viceroys. He erected fortresses and temples in foreign lands, and embellished all Egypt with his edifices. He had two wives, twenty-three sons, and seven daughters, and was finally buried in the Biban-El-Melook. He is the supposed Sesostris, according to most authors. He reigned 68 years.—4. R. III., chief of the 20th dynasty, the Rhampsinitus of Herodotus, called Meriamoun, or beloved of Ammon, who defeated the Philistines, the Mashuash, and the Libyans, carrying on important wars from the 5th to the 12th year of his reign; he also made conquests in the 16th, and seems to have reigned 55 more years. He founded the magnificent pile of edifices of Medinat Habu, embellished Luxor, Gurnah, and other parts of Egypt. Some attribute to him the exploits of the R. of the Greek and Roman writers—5. R. IV. reigned a short time, and performed no distinguished actions.—6. R. V., of whom inscriptions are found at Silsilis.—7. R. VI., whose tomb at the Biban-El-Meluk contains some astronomical records from which the date of his reign has been calculated at 1240 B. C.—8—12. R. VII., VIII., IX., X., and XI., undistinguished monarchs.—13. R. XII., who reigned above 33 years, in whose reign the statue of the god Chons was sent from Egypt to the land of the Bakhten, to cure a princess of the royal family of that court, with which R. had contracted an alliance.—14. R. XIII., an unimportant monarch.

Rameses is also the name of one of the fortresses or treasure-cities built by the Hebrews during their residence in Egypt. The name of this fortress, all important for the date of the Exodus—placed 1491 B. C. by the old chronologers, and 1314 B. C. by Lepsius—is found in the papyri of the British Museum in documents of the age of Meneptah, while R. III. is represented at Medinat Habu in one of his campaigns marching out of the Magdol of Rameses. The situation of Rameses has much puzzled geographers and commentators, and it has been supposed to be Abaris, Baal-Zephon, Heroonpolis, Pelusium, and Abu-Kescheh. Notwithstanding the opposition to dating Fort Rameses in the period of the 19th dynasty, it is now generally admitted to have been constructed at that period. In fact, no fort was ever named by the appellation of a prince, it being the prerogative of the monarch to have the fortresses named after him. Nor is it possible to suppose the name Rameses changed for another older name in the Mosaic writing, without impugning the text; and the evident solution of the difficulty is, that the Exodus of the Hebrews took place under a king Rameses, at whatever chronological period his reign may have happened.—Exodus, i. 11; Lepsius, *Einleit*, 336, and foll.; Chabas, *Mélanges*, 2d series, p. 108; Brugsch, *Histoire d'Egypte*, p. 126; Champollion-Figeac, *L'Egypte*, p. 322.

RAMILLIES, an inconsiderable village of Brabant, Belgium, 13 miles north of Namur, and 28 miles south-east of Brussels, is memorable as the

place near which one of the most important battles of the War of the Spanish Succession was fought, May 23, 1706. In this conflict, the French forces were under the command of Marshal Villeroy and the Elector of Bavaria, while Marlborough led the troops of the Allies. Villeroy, after a battle of three hours and a half, was defeated, with the loss of almost all his cannon, the whole of his baggage, and 13,000 men in killed and wounded. The great result of this victory was that the French were compelled to give up the whole of the Spanish Netherlands.

RA'MMELSBERG, one of the Harz Mountains, rather less than 2200 feet high, and celebrated for its mines, which yield gold, silver, lead, zinc, copper, sulphur, vitriol, and alum. They have been worked, according to tradition, from the year 968; and their possession was for ages a source of strife between the inhabitants of Goslar (q. v.) and the Dukes of Brunswick.

RAMMOHUN ROY, a celebrated Hindu rajah, was born at Bordnan, in the province of Bengal, between 1774 and 1780. In a sketch of his own life, written in 1832, he states that his ancestors were Brahmans of a high order. At home, he acquired the usual elements of native education, with some knowledge of the Persian language. At Patna, and afterwards at Benares, he studied Sanscrit, and the works written in it, which contain the spirit of Hindu law, literature, and religion. At a very early age, he began to compare the evidence for and against the various religious doctrines held by those around him; nor did he except from this investigation those doctrines in belief of which he himself had been brought up. Finding them all repugnant to his vigorous understanding, he boldly acknowledged this fact both to himself and to the world. The result was a quarrel with his father, his family, and his community. He appears, indeed, to have succeeded in converting the understanding of his mother; but it, in its turn, was overcome by her sentiment. 'You are right,' she said to him, when she was about to set out on a pilgrimage to Juggernaut; 'but I am a woman, and cannot give up observances which are a comfort to me.' R. R. spent two or three years of his youth in Tibet, where he excited general anger by denying that the Lama was the creator and preserver of the world. For a long time, he had a strong, and, perhaps, not unfounded dislike to the English; but becoming convinced that their sway was, on the whole, beneficial to India, his views changed, and he applied himself to the study of the English language. For five years, he held the office of Revenue Collector in the district of Rungpoor. In 1803, his father died, but left him no part of his estate. In 1811, however, by the death of his brother, he succeeded to affluence. 'After my father's death,' he says, 'I opposed the advocates of idolatry with still greater boldness.' He published various works in Persian, Arabic, and Sanscrit; the object of the whole being the uprooting of idolatry. His principal work, called the *Vedant*, is a digest of, and comment on, the Vedas, the ancient writings which embody the theology of the Hindus. Becoming more convinced, as he grew older, of the excellence of the moral theories of Christianity, in 1820 he published *The Precepts of Jesus, the Guide to Peace and Happiness*. It appears from this work, that while he believed in the morality preached by Christ, he did not believe in the divinity of the preacher. He rejected the miracles also, and other portions of the gospels held to be fundamental in the various churches of Christendom. The book, therefore, as was to have been expected, met with severe ecclesiastical censure, the grounds of censure being various and conflicting. In April 1831, the rajah visited England. The great question of parliamentary reform was then agitating the country. Of the Reform Bill he wrote, that it 'would, in its consequences, promote the welfare of England and her dependencies; nay, of the whole world.' His society was universally courted in England. He was oppressed with invitations to attend social parties, and political and ecclesiastical meetings. His anxiety to see everything and to please all, led him to overtask himself to such an extent that his health, long failing, at last quite broke down. He died at Bristol, September 27, 1833. The adverse circumstances of his birth were such as might easily have enslaved even his powerful understanding, or still more easily, might have perverted it to selfish ends; but he won his high position by an inflexible honesty of purpose and energy of will.—See Sketch of his Life, written by himself, in the *Athenæum*, No. 310, October 5, 1833; also *Chambers's Edinburgh Journal*, August 2, 1834.

RAMNEGHA'R, or **RAMNUGGUR** (Town of God), formerly called Rasulnuggur, a large town of the Punjab, beautifully situated in an extensive plain on the left bank of the Chenab, 65 miles north-north-west of Lahore. There is here a ferry across the river, which is 300 yards wide, and 9 feet deep; but two miles lower there is a ford, at which the depth is only 3 feet, when the water is at its lowest. The town is surrounded by walls, and contains eight well-supplied bazaars. Pop. stated at 11,000.

RAMNEGHAR, or **RAMNUGGUR**, a town of British India, in the district of Benares, and four miles south of the city of that name, on the right bank of the Ganges. Its fort, the residence of the rajah, rises from the banks of the sacred stream by a number of fine ghâts or flights of stairs. Pop. 9490.

RAMP, a sudden upward curve in the hand-rail of a stair.

RAMP, in Fortification, is a gradual slope by which approach is had from the level of the town or interior area to the terreplein or general level of the fortifications behind the parapet.

RA'MPANT (Fr. literally, 'raging'), in Heraldry, an epithet applied to a lion or other beast of prey when placed erect on the two hind-legs, with only one of the fore-legs elevated, the head being seen in profile. When the face is turned towards the spectator, the attitude is called *rampant gardant*, and when the head is turned backwards, *rampant regardant*. A lion *counter-rampant* is one rampant towards the sinister, instead of towards the dexter, the usual attitude. Two lions rampant contrary-ways in saltier, are sometimes also said to be counter-rampant.



Rampant.

RA'MPART, forms the substratum of every permanent fortification. See FORTIFICATION. It constitutes the enceinte, and is constructed immediately within the main ditch by throwing up the

soil excavated from it. On the front of the rampart, the parapet is raised, and width should be left behind it to allow of guns, wagons, and troops passing freely on the top of the rampart. The height of the rampart is dependent on the relief (height) of the buildings to be defended, and on the positions in the neighbourhood which an enemy might assume.

RAMPHA'STIDÆ. See TOUCAN.

RAMPION (*Campanula rapunculus*; see CAMPANULA), a perennial plant, a native of Europe, rare in England, with a stem about two feet high, and a panicle of very pretty pale-blue bell-shaped flowers. The radical leaves are ovato-lanceolate and waved. The root is white and spindle-shaped, and was



Rampion.

formerly much used for the table, under the name of *Rampion* or *Ramps*. The plant is now little cultivated in Britain, but is still commonly cultivated in France for the sake of its roots, which are used either boiled or as a salad, and of its young leaves, which are also used as a salad.

RAMSAY, ALLAN, an eminent Scottish poet, was born in the parish of Crawford, Lanarkshire, October 15, 1686. His father was manager of Lord Hopetoun's mines at Leadhills, and his mother, Alice Bower, was the daughter of a Derbyshire miner. To this maternal descent, we may perhaps trace Allan's peculiar frankness and gaiety of temperament. In his 15th year (by which time he had lost both of his parents), he was put apprentice to a wigmaker in Edinburgh. He had received the ordinary education of a parish school, and could read Horace, as he says, 'faintly in the original.' Up to his 30th year, he continued to follow the occupation of a wigmaker; and by this time, he had become known as a poet, having issued several short humorous pieces, printed as broadsides, and sold for a penny each. He had also written (1716—1718) two additional cantos to the old Scots poem of *Christ's Kirk on the Green*, attributed to James I. These two cantos gave such genuine pictures of rustic life, and presented such felicitous scenes of broad humour, that it was obvious their author was destined to become the restorer of Scottish poetry. Patronised by the highest and worthiest of the land, R. now abandoned wigmaking, and commenced business as a bookseller. His shop was 'opposite Niddry's Wynd,' and he placed a sign of Mercury over his door. Subsequently, as his success increased, he removed to the Luckenbooths, and deposing Mercury, set up heads of Drummond and Ben Jonson. He also added to his business a circulating library, the first established in Scotland. From 1718, when he opened shop as a bookseller, down to 1755, when he retired to a villa of his own erection, R.'s career, worldly and literary, was eminently prosperous. He was careful and industrious, determined, he said, to shew the world that *poortith*, or poverty, was not 'the poet's lot;' and though he was always courting patronage, he never selected a fool for his patron, nor did his pride and vanity as a poet ever withdraw him from business. The following are his principal works: *Tartana, or the Plaid*, 1721; a collected edition of his *Poems*, published by subscription in 1721, by which it is said the poet realised 400 guineas; *Fables and Tales*, 1722; *Fair Assembly*, 1723; *Health, a Poem*, 1724; *The Tea-table Miscellany*, a collection of the most choice songs, Scottish and English, 1724, to which a second volume was published in 1725, a third in 1727, and a fourth in 1740; *The Evergreen*, 'being a collection of Scots Poems wrote by the Ingenious before 1600,' published in 1724; *The Gentle Shepherd, a Pastoral Comedy*, 1725, to which songs were added in 1728; a second collection of *Poems* published by subscription, 1728; *Thirty Fables*, 1730. Of most of these publications, numerous editions were called for, no less than nine of the *Tea-table Miscellany* being issued in nine years. One brief cloud overcast the poet's successful career. He entered into a speculation for the encouragement of the drama, and built a theatre in Edinburgh, which was almost immediately shut up by the magistrates, in virtue of the act passed in 1737 prohibiting all dramatic exhibitions without special licence. This affair was a serious loss to the poet, and subjected him to the annoyance of attacks from poetasters and morose religionists, such as 'A Looking-glass for Allan Ramsay,' 'The Dying Words of Allan Ramsay,' 'The Flight of Religious Piety from Scotland upon the account of Ramsay's Lewd Books and the hell-bred Playhouse Comedians,' &c. Allan bore all with Horatian philosophy and indifference; but he addressed a poetical epistle to his friend, Duncan Forbes of Culloden, then Lord Advocate, claiming compensation for his losses, or, at least, that he might be 'edged into some canny post.' This request does not seem to have been complied with, but Allan had amassed a decent competency. The last two or three years of his life were spent in cheerful retirement in the quaint but picturesque house he had built on the north side of the Castle Hill, and there he died on the 7th of January 1758. He had the gratification of seeing his only surviving son, ALLAN RAMSAY (born in 1713, died in 1784), fast rising into distinction as a portrait-painter, and esteemed by the most eminent men of his day as an accomplished scholar and gentleman. This second Allan Ramsay had been carefully educated by his father, and sent to Rome to study art. On his return, being introduced to the Prince of Wales, afterwards George III., he rapidly rose into favour; and in 1767 was appointed principal painter to the king.

The *Gentle Shepherd* of R. is his greatest work, and, indeed, is esteemed as the best pastoral in any language. Its characters are realities, not shadowy Corydons or Phyllises, maundering over crooks, or sleeping to the murmur of bees. It contains faithful transcripts of actual life and feeling, such as the poet had witnessed in his youth on the banks of the Clyde and Glengonar. The poetry, too, abounds in graphic expression and touches of homely nature and arch humour, that to Scotsmen are irresistible, while the plot is skilfully constructed, and brings out rustic character, customs, and superstitions. Some of R.'s tales and fables are amusing,

but coarse. His songs also are occasionally defective in respect of simplicity and delicacy, though he has made some exquisite additions to our lyrical poetry. In his Jacobite allegory, *The Vision*, he rises into the higher region of inspiration, apparently imitating, and certainly rivalling Dunbar. As an editor, he has been censured for tampering with the works of the old bards, retouching, adding, or retrenching at his pleasure. But he also rescued many choice productions of the elder muse from neglect, and awakened in Scotland a taste for its native literature. A complete edition of his poems with a biography was published by George Chalmers (2 vols., 1800). The latest edition—very correct—appeared at New York in 1854.

RAMSDEN, JESSE, a celebrated instrument-maker, was born at Salterhebble, near Halifax, Yorkshire, in 1735. He received a good education, and, after being engaged as a cloth-worker, and become (1762) a working engraver and divider in London, and having married Dollond's (q. v.) daughter, received, as her dowry, a share in his father-in-law's patent for achromatic telescopes. The sextants of his time were very imperfect, being untrustworthy within 5′ of a degree, and R. succeeded in reducing the possible error to within 30″. His skill thus shewn, and the cheapness of his instruments (two-thirds of the price charged by other makers), soon created such a demand as tasked his utmost energy to meet. To increase the amount and improve the quality of the work done by his men, he introduced the principle of the division of labour, besides inventing a dividing-machine, which could graduate instruments much more rapidly and accurately than could be done by hand. For this invention, he received from the Board of Longitude a premium of £615. He constructed the theodolite used by General Roy (q. v.), and also telescopes for the observatories of Blenheim, Mannheim, Dublin, Paris, and Gotha, and mural quadrants for those of Padua and Vilna, the accuracy of all of which was a matter of admiration and delight among astronomers. He was one of those who strongly recommended the introduction of the mural circle in place of the Quadrant (q. v.), and he constructed two of the former instruments for the observatories of Palermo and Dublin. The minor scientific instruments invented or improved by him are also numerous. He died at Brighton, 5th November 1800, leaving a moderate fortune, a large portion of which was, in accordance with the terms of his will, divided among his workmen. R. was a member of the Royal Society, a Fellow of the Imperial Academy of St Petersburg, and the possessor of a Copley medal (the gift of the Royal Society).

RA'MSEY, a town in the Isle of Man, lying 16 miles north of Douglas, and which, from the beauty of its situation and the salubrity of its climate, is rapidly becoming a favourite resort of tourists and pleasure seekers. It stands on the margin of a spacious bay, and has a background of lofty and well-wooded hills. The anchorage in the bay is good, and the waters abound in mackerel, herrings, salmon, and other fish. An extensive ship-building yard has recently been opened here, which gives occupation to about 300 men. A steam-packet plies between Liverpool and R. three times a week in the summer, and once a week in winter, and between Whitehaven and R. twice a week in summer and once a week in winter. Pop. (1861) 2839.

RA'MSGATE (*Rium's* Gate; *Rium* is the British name of Thanet), a seaport, market-town, and favourite watering-place in the county of Kent, in the south-east of the Isle of Thanet, 97 miles east-south-east of London by railway. Anciently, it was a small fishing-village; but it began to increase in importance about the beginning of the 18th c., when a number of its inhabitants opened up a successful trade with 'Russia and the east country.' The recently-built portion of the town consists of well-arranged streets, crescents, and terraces; and the older part is situated in a natural depression or cutting in the chalk-coast, opening out toward the sea, and called in this district a 'gate' or 'stair.' R., as a watering-place, is slightly more aristocratic than Margate (q. v.); and during the season, which lasts from the middle of summer to the end of autumn, the charges are very high. At the height of the season, the population of the town is increased to 22,854. The climate is much more bracing than that of the southern coast, and exercises a salutary influence in cases of scorbutic disorder. The harbour of R.—40 acres in extent, and enclosed on the east by a splendid pier 3000 feet in length, and on the west by another pier 1500 feet long—serves as a harbour of refuge for the Downs. About 1½ miles west of R. is Osengall Hill, on which a number of Saxon and several Roman graves have been recently discovered, and a large number of most interesting relics, as spear-heads, coins, ornaments in silver, &c., armour, glass and amber beads, &c., found. (See Wright's *Wanderings of an Antiquary*.) Ship-building and rope-making are here carried on, and coal is imported. In 1863, 501 vessels, of 40,933 tons, entered and cleared the port. Pop. 11,865.

RAMSHORNS, in Fortification, are semicircular works of low profile in the ditch, which they sweep, being themselves commanded by the main works. They were invented by M. Belidor, a great French engineer, and when used, take the place of *Tenailles* (q. v.).

RA'MSKIN, a species of cake, which consists of grated cheese of some dry kind, such as Parmesan or the white hard English varieties, incorporated with dough as prepared for fine puff-pastry; then rolled out, and cut into shapes, glazed with white of egg, and baked for a quarter of an hour. It is usually eaten hot. This dish is said to have been invented at Croxteth Hall, the seat of Lord Sefton, whence it is sometimes called 'Sefton fancy.'

RAM-TIL (*Guizotia oleifera*), a plant of the natural order *Compositæ*, suborder *Corymbiferæ*, a native of the East Indies and Abyssinia, much esteemed for the bland oil which is obtained from the seeds, and which is employed for the same purposes as olive oil. The R. is extensively cultivated in India, chiefly in Mysore, and to some extent also in Abyssinia.

RAMUS (Latinised form of *La Ramée*), PIERRE, an illustrious French 'humanist,' was the son of a poor labourer, and was born at the village of Cuth, in Vermandois, in 1515. His thirst for knowledge was so great, that twice before he had reached his 12th year, he travelled on foot to Paris, with the hope of getting into some school there, but the misery of want twice drove the brave boy home again. In his 12th year, however, he got a situation as servant to a rich scholar at the Collége de Navarre; and by devoting the day to his master, obtained the night for study, and made rapid progress. The method of teaching philosophy then prevalent dissatisfied him, and he was gradually led to place a higher value on 'reason' than on 'authority,' contrary to the mental habit of his time. His contempt, indeed, for 'authority' blinded him (as is often the case with a young reformer) to what truth 'authority' might contain, and when taking his degree of M.A., in his 21st year, he maintained

the extravagant thesis, that 'all that Aristotle had said was false' (*quæcunque ab Aristotele dicta essent, commentitia esse*). It says a great deal for the ability he shewed on this occasion, that his judges, although themselves Aristotelians, were compelled to applaud him. Immediately after, R. became a teacher in the Collége du Mans, and along with two learned friends opened a special class for reading the Greek and Latin authors, designed to combine the study of eloquence with that of philosophy. His audience was large, and his success as a teacher remarkable. He now turned his attention more particularly to the science of logic, which, in his usual adventurous spirit, he undertook to 'reform;' and no one acquainted with his system, will deny that many of his innovations were both rational and beneficial. His attempts excited much hostility among the Aristotelians, and when his treatise on the subject (*Dialecticæ Partitiones*) appeared in 1543, it was fiercely assailed by the doctors of the Sorbonne, who managed to get it suppressed by a royal edict, and even barbarously demanded that its author should be sent to the galleys. But R. had (at this time) two powerful friends, Cardinals Charles de Bourbon and Charles de Lorraine, who protected him from personal injury, and through whose influence he was, in 1545, appointed principal of the Collége de Presles, which he raised from a condition of decay to the most splendid prosperity. In 1551, Cardinal Lorraine succeeded in instituting for him a chair of Eloquence and Philosophy at the Collége Royal; and his inaugural address (*Pro Philosophica Disciplina*, Par. 1551) is reckoned a masterpiece of the kind. He devoted the first eight years of his teaching to the first three of the 'liberal arts' (Grammar, Rhetoric, and Logic), which he called elementary or exoteric, and published three grammars successively, Greek, Latin, and French. He also mingled largely in the literary and scholastic disputes of the time, and on account of his bustling activity, came under the satire of Rabelais. But though R. had innumerable adversaries, he might have defied them all, so great was his influence at court, had his love of 'reformation' not displayed itself in 'religion' as well as in logic. In an evil hour (for his own comfort), he embraced Protestantism. He had long been suspected of a leaning that way, and, as we have seen, his intellect was by nature scornfully rebellious towards the *ipse dixit* of 'authority;' but he had for years decently conformed to the practices of the Catholic cult, and it was only after Cardinal Lorraine, in reply to the Conference of Poissy (1561), frankly admitted the abuses of the church and the vices of the clergy, that he ventured formally to abjure the older faith. The outbreak of the religious wars in France plunged him into the dangers of the time, and he finally perished in the fatal massacre of St Bartholomew, August 1572. It is believed that he was assassinated at the instigation of one of his most violent and persistent enemies, Charpentier, Rector of the Collége de Presles.

R. holds a most honourable place in the list of intellectual reformers. His assault on scholasticism as a *method of thinking* is vigorous, and, on the whole, well directed; his exposure of its puerile and useless subtleties is thorough, and entirely in accordance with later criticism. In his contempt for the illiterate worship of Aristotle, in his admiration of Plato and of the ancient orators and historians, he ranks (though late) with the scholars of the Renaissance; but in his assertion of 'reason' as the supreme criterion of truth, he must be regarded as the forerunner of Descartes and the modern world. His system of logic, by which perhaps his name is best known, is marked by its lucid definitions, its natural divisions, and its simplification of the rules of the syllogism; but (like every pre-Baconian system) it fails to realise the supreme importance of the inductive method. What strikes one most, however, in R. is not so much his particular achievements, as his universal intellectual activity. He was the first mathematician of his age in France, and wrote treatises on arithmetic, geometry, and algebra, which were text-books for a hundred years; he was among the earliest adherents of the 'Copernican' system of astronomy, and in natural philosophy avowed himself an enemy to hypotheses and abstractions; rhetoric, morals, theology, all engaged his pen, and he seldom handled a subject which he did not to some degree elucidate. His followers were a widespread, and for long a powerful body of thinkers and teachers. France, England, the Low Countries, Germany, Switzerland, Denmark, and even Spain, had their *Ramists*, as they were called, and they have disappeared chiefly because their tendencies are embraced in the broader and more critical methods of modern scientific inquiry. A list of his writings is given in the *Nouvelle Biographie Universelle*, article 'Ramus.'—See Waddington's *Ramus, sa Vie, ses Ecrits, et ses Opinions* (Paris, 1855); E. Saisset's *Les Précurseurs de Descartes* (Paris, 1862); and C. Desmaze's *P. Ramus, Professor au Collége de France, sa Vie, ses Ecrits, sa Mort* (Paris, 1864).

RA'NA and **RA'NIDAE.** See FROG.

RANCÉ, ARMAND JEAN LE BOUTHELIER DE, the well-known founder of the reformed order of La Trappe (see TRAPPISTS), was born January 9, 1626, at Paris, where he was educated. Having taken his degree in the Sorbonne with great applause, and embraced the ecclesiastical profession, he soon became distinguished as a preacher, and through the favour of Cardinal Richelieu, obtained more than one valuable benefice. He succeeded, while yet a young man, to a large fortune, and for a time, notwithstanding his clerical character, was carried away by the gaiety and dissipation of Parisian life. After a time, however, having forfeited the favour of Cardinal Mazarin, and being deeply moved by the death of a lady, the Duchess de Montazon, to whom he was much attached, he withdrew from Paris, and after a time resolved to sell all his property, to distribute the proceeds among the poor, and to devote himself exclusively to the practice of piety and penitential works. Finally, he resigned all his preferments (of which, by the abusive practice of the period, he held several simultaneously), with the exception of the abbacy of La Trappe, to which convent he retired in 1662, with the intention of restoring the strict discipline of the order. The history of the reforms which he effected will be found under the head TRAPPIST. He lived in this seclusion for 33 years, during which he published a large number of works, chiefly ascetical. The only remarkable event of his literary life was his controversy with Mabillon, in reply to his *Etudes Monastiques*, on the subject of the studies proper for the monastic life. R.'s work is in 4to, 1692. In his youth, he had edited *Anacreon*, in one volume octavo (Paris, 1639), with a dedication to Cardinal Richelieu. He died October 27, 1700.

RANCHE'ROS (from the Spanish *rancho*, comradeship) is the name given in Mexico to a mixed breed of Spanish and Indian blood, who inhabit the country, and may almost be said to live in the saddle from their youth, are splendid riders, and hunters, and form the bravest part of

the Mexican army—its irregular cavalry. The importance of their services was seen in the wars with the United States. The R. are lank in frame, with brown weather-stained faces and muscular limbs, hardy, temperate, and always ready for the boldest enterprises. They practise polygamy.

RANCI'DITY. See OILS AND FATS.

RA'NDERS, a town in Jutland, chief town of the *Amt* or bailiwick of the same name, is situated on the Guden, at its entrance into the Randers-Fiorde, 20 miles from the mouth of the latter in the Cattegat. Though still fortified, it has much declined from its early *prestige* and importance. Brewing, distilling, and the manufacture of gloves, which are in high repute, and of stockings and cloth, are carried on. Pop. 8844.

RANDOLPH, JOHN, OF ROANOKE, an American statesman, was born at Cawsons in Chesterfield County, Virginia, June 2, 1773. He was descended from an ancient and wealthy family, and boasted that the Indian princess Pocahontas was one of his ancestors. Educated at Princeton and Columbia Colleges, he embraced the profession of the law, and in 1799 was elected to Congress, where he became distinguished for his eloquence, wit, sarcasm, invective, and eccentricity, and for thirty years was more talked and written of than any American politician. Tall and meagre, peculiar in dress and manners, he was described as a strange mixture of the aristocrat and the Jacobin. He was the Democratic leader of the House of Representatives, but quarrelled with Jefferson, and opposed the war of 1812, and the Missouri Compromise, and stigmatised the Northern members who voted for it as 'Dough-faces.' In 1822 and 1824, he visited England, where his eccentricities attracted much notice. In 1825, he was chosen United States' senator from Virginia, and in 1830 appointed Minister to Russia. By his will, he manumitted 318 slaves, and provided for their maintenance in a free state. He died in Philadelphia, June 24, 1833. See *Life of John Randolph*, by Garland (2 vols., New York, 1850).

RANGE, in Gunnery, is the distance between a point on the ground vertically below the muzzle of the piece and the point on the same level at which the projectile touches in its descent. The point-blank range is when the piece is fired in a horizontal position; the range then increases with the elevation; and if the air opposed no resistance, the greatest range would be attained with the piece elevated at an angle of 45°; but in practice this angle is found to be, on an average, a little over 30°. As the resistance of the atmosphere increases as the square of the velocity of the shot, being also in the direct ratio of its front section, while the momentum is as the velocity multiplied by the weight; it follows that a heavy shot should have a greater range than a light one; and that of two shots of the same weight, an elongated cylinder of small diameter will have a longer range than a spherical ball of greater diameter. On the other hand, from the rapid increase in a duplicate ratio of the resistance, as compared with the initial velocity, the range only increases to a certain point, in consequence of a more rapid flight of the projectile. The longest range yet attained has been by Mr Whitworth with a 12-pounder rifled cannon, with which he sent a bolt 10,300 yards—only 260 yards short of 6 miles!

RANGOO'N, the principal seaport and chief town of Pegu (q. v.), is built on the left bank of the Rangoon River, the eastern branch of the Irrawaddi, at the distance of 26 miles from the sea, in lat. 16° 47′ N., and long. 96° 13′ E.* R. was founded or rebuilt by the great Alompra in 1755. The British flag was first planted in the town, May 1824, when the Anglo-Indian troops took possession of it at the commencement of the first Burman war. The second Burman war began with the bombardment of R., April 11, 1852, and it was captured April 14, by the united forces of Bengal and Madras. At the close of the contest Pegu was annexed to British India, and R. became a part of the same territory. According to the returns of 1862, the inhabitants of R. amount to a total of 55,884 souls, irrespective of a large floating population. A great change has taken place in R. under the dominion of the British, and large sums have been expended on its improvement. Capital roads and streets now intersect every part of the town. The native town is of a very mean appearance, but many substantial buildings of brick or stone have been erected by the European inhabitants. R. possesses a government naval yard, and a patent slip for repairing ships.

R. is a stronghold of Buddhism, and on every side are seen gigantic monuments, that from age to age have been erected by the followers of Gau-ta-ma; pagodas, temples, images, wonderful in their vastness and grotesque splendour. Of these, the most notable is the famous *Shoay Dagon*, or Golden Dagon dagoba, or shrine, the foundation of which is said to have been laid 2300 years ago. It lies about two miles north of the town, on elevated ground, and the area on which it stands is 800 feet square. The dagoba itself is a stupendous mass of solid masonry, tapering gradually from an octagonal base of 1355 feet to a spire of small circumference, which is surmounted by the sacred *tee*, or umbrella of open iron-work. The whole building is one dazzling blaze of gold, and altogether forms a most magnificent object, its magnitude and massiveness being very remarkable. This celebrated monument derives its peculiar sanctity from being the depository, according to Burman tradition, of relics of the last four Buddhs—viz., the staff of Kan-tha-than, the water-dipper of Gau-na-gon, a garment of Ka-tha-pa, and eight hairs from the head of Gau-ta-ma. The shrine is surrounded by numerous temples, containing colossal images of Gau-ta-ma, richly gilt, and sitting in solemn conclave, cross-legged, like so many tailors at a Quakers' meeting.

R., possessing a continuous water-communication with the upper provinces and the Burman kingdom, is very favourably situated for internal as well as for foreign commerce. Teak-timber, and rice are the principal exports by sea, but they also include copper, raw cotton, Cutch hides, ivory, lead, yellow orpiment, petroleum, precious stones, shell lac, and tobacco. The imports by sea consist of betel-nut, cotton twist, cotton piece goods, silk and woollen piece goods, raw silk, spirituous liquors, and wines. For the official year 1862—1863 the value of exports from R. was 13,305,236 rupees, and of imports, 144,660,775 rupees.—Winter's *Six Months in British Burmah* (Lond. 1858); personal observation.

RANK.—*Army rank* is somewhat confusing from its varieties, and from the fact that the same officer may hold at once three different ranks. The first and only rank up to the grade of captain is *regimental* or *substantive* rank. Above this, officers may advance in two ways: first, up to the rank of lieutenant-colonel by substantive or regimental rank; second, up to colonel by obtaining rank in the army, generally called *brevet rank*, and above that by army rank through the several grades of general officers. In his regiment, the officer holds only his regimental

* This is the situation of the great pagoda.

rank, whatever his brevet rank may be; but among officers of the army generally he takes precedence according to his brevet rank. In describing an officer who has brevet rank, his regimental rank is placed first—as, Captain and Brevet-lieutenant-colonel Brown, which means that an officer named Brown, who holds rank in a regiment as captain, has for his services been promoted in the army to be lieutenant-colonel. Officers of the Foot-Guards have higher rank in the army. See FOOT-GUARDS. Another class of rank is relative rank, which attaches to certain offices. Thus, Captain Brown aforesaid, in addition to regimental rank as captain, and army rank as lieutenant-colonel, may possibly hold a staff appointment which confers on him the relative rank of colonel. *Local rank* is a common expedient for advancing comparatively junior officers to important duties, a higher rank than that properly held in the army being assigned to an individual within certain geographical limits, as in the East Indies, the Crimea, &c. *Temporary rank* is similarly limited by time, and is conferred usually for the period during which some appointment is held, as the officer acting as Director of Ordnance ranks as major-general while so employed. *Honorary rank* carries neither duty nor emoluments; it is commonly given to the amount of one step to an officer who has served the time necessary for retirement; thus, a captain, after thirty years' service, may retire (on the pay of captain) with the honorary rank of major. Officers who have quitted the army are also allowed to retain as honorary the last rank they held.

Navy rank has no irregularities: it is plainly what it professes to be. The marines rank with corresponding grades in the army; and their and the army rank, as compared with the navy, will be shown under RELATIVE RANK (q. v.).

RANK AND FILE, the body of soldiers constituting the mass of the army, and including corporals, bombardiers, and privates. Rank and file means literally the lines of men from side to side, and from front to back—a rank being a row of men standing side by side, and a file of soldiers a line of men standing one behind another. The strength of a force is reckoned by its rank and file; the non-commissioned and commissioned officers forming the supernumerary ranks charged with the direction of the mass.

RANKÉ, LEOPOLD, one of the most distinguished modern historians of Germany, was born at Wiehe in Thuringia, 21st December 1795, and educated for a schoolmaster. In 1818, he was appointed Rector of the gymnasium at Frankfurt-on-the-Oder; and in 1824 published at Berlin his first work, *Geschichte der Roman. und German. Volkerschaften von* 1494—1535. It attracted considerable notice; and in the following year he was called to Berlin as Extraordinary Professor of History at the university, where his lectures soon began to be numerously attended. About this time, his attention was directed to the historical value of the reports sent home by the Venetian ambassadors at the different European courts during the 16th and 17th centuries, and the result of his studies and investigations among these was his *Fürsten und Völker von Südeuropa im* 16 *und* 17 *Jahrh.* (Berl. 1827), in which the affairs of Turkey and Spain are specially handled. Immediately after the publication of this work, he commenced a four years' tour through Europe, for the purpose of examining the archives of the different nations. The fruit of his varied researches partly appeared in his *Serbische Revolution* (Berl. 1829), *Verschwörung gegen Venedig im J.* 1688 (Berl. 1831), and *Vorlesungen zur Geschichte der Ital. Poesie* (Berl. 1837); but a much greater and more valuable performance than any of these was *Die Röm. Päpste, ihre Kirche und ihr Staat im* 16 *und* 17 *Jahrh.* (3 vols., Berl. 1834—1836; 3d ed. Berl. 1844—1845), a work which, on account of its important conclusions regarding the character and policy of the papacy, many of which it may be said to have almost placed beyond controversy, was not only received with unbounded applause in Germany, but was translated again and again in Holland, England, France, and America, and may be regarded as one of the most widely-circulated and influential histories of modern times. It was followed up by his *Deutsche Geschichte im Zeitalter der Reformation* (6 vols. Berl. 1839—1847), considered in Germany his most finished and thorough production, and in the composition of which he was enabled to avail himself of many documents never before published or made use of. In a still higher degree than in his earlier writings, we find displayed here his skill in grouping events together in a vivid and intelligent manner, placing them before the eye of the reader in their whole significance, with all their causes, relations, and consequences. R.'s next effort may be looked upon as a continuation of his history of Protestantism. It is entitled *Neun Bücher Preuss. Geschichten* (3 vols. Berl. 1847—1848), and was worked up from the Prussian historical archives, opened to literature for the first time. The stormy period of 1848 found him in the Frankfurt parliament; but he did not acquire any distinction in that arena of babbling and incompetent patriots, and soon betook himself again to more familiar and more valuable labours. His *Franz. Geschichte vornehmlich im* 16 *und* 17 *Jahrh.*, which appeared at Stuttgart (1852—1857), is an admirable work, full of new information and enlightened views; and his *exposé* of the reign of Louis XIV. is put, even by French critics, on a level with that of Voltaire. A still later production is his *Englische Geschichte vornehmlich im* 16 *und* 17 *Jahrh.* (Berl. 1859—1862). R. has been an ordinary professor of history since 1834, and in 1841 was appointed historiographer of the Prussian kingdom. He has trained a numerous body of historical students, who have followed the spirit and method of their master.—R. has three brothers, FRIEDRICH HEINRICH RANKE (born 1797), KARL FRIEDRICH RANKE (born 1802), and ERNEST RANKE (born 1814), who have also risen to eminence as churchmen and scholars.

RANKING AND SALE is, in Scotch Law, an action whereby the land or heritable property of an insolvent person is sold, and the proceeds divided among the creditors. The main object is to sell the property in spite of the debtor, and have the proceeds distributed among the creditors, for which purpose it is necessary to arrange or rank the creditors according to their respective legal priorities. The sale takes place in the Parliament House at Edinburgh, one of the macers acting as auctioneer. If no offerers appear, the sale is adjourned, and the upset price is lowered.

RANKNESS, an excessive luxuriance of growth in vegetables, a condition as unfavourable as its extreme opposite to their health and to the productiveness of crops. It is often caused by injudicious manuring, and is most frequent in moist seasons. The decay of mushrooms in pastures, as in Fairy Rings (q. v.), sometimes produces a rankness of grass which causes all animals to refuse it; such herbage abounding to an unusual degree in Chlorophyll (q. v.), but being very deficient in those qualities which render herbage most palatable and nutritious to cattle. Rankness in grain-crops is attended with a diminished production of grain, the flowers

often proving abortive, and with a much increased liability to the attacks of parasitic fungi. In fruit-trees, it displays itself, even when the soil is only a little too rich, in a tendency to the production of shoots and foliage, instead of blossoms and fruit, and is to be counteracted by withholding manure, by root-pruning, or by cutting away portions of bark. In wall-trees, deep cuts may even be made into the wood, although in standards this would involve a danger of destruction by the next storm.

RA'NNOCH, MOOR AND LOCH. The Moor in the north-west extremity of Perthshire, with a mean elevation of about 1000 feet above sea-level, is a wild waste, 28 miles long, and 16 miles broad, and is one of the largest and most desolate and dreary moors in Scotland. Its surface is for the most part a broad, silent, and featureless tract of bog, heath, and rock, girdled by distant and gloomy mountains. In its western part is Loch Lydoch, which winds amid flat and dismal scenery. Stretching eastward from the Moor is Loch R., about 9 miles long by from 1 to 2 miles broad. It is surrounded by mountains, contains two islands, and is drained of its surplus waters by the Tummel, a tributary of the Tay.

RA'NSOM—corrupted from the Latin *redemptio*—is the price paid by a prisoner-of-war, or paid on his behalf, in consideration of his being granted liberty to return to his own country. In early times, when armies received little or no regular pay, the soldier looked for his reward in the booty he might capture, and this booty included the bodies as well as the chattels of the vanquished. The conqueror had the option of slaying his prisoner; but for his profit, he would make him his slave, or sell him into slavery. The transition would be natural to accepting compensation from the prisoner himself, and setting him at liberty. In feudal warfare, the ransoms formed a large portion of a soldier's gains; those for persons of low degree belonging to the individual captors; but those for princes or great nobles, to the king. Ransoms were sometimes of large amount, more than the immediate family of the captive could pay. His retainers were then required by feudal usage to contribute; as in the case of redeeming King Richard I. for £100,000, when twenty shillings was assessed on every knight's fee, and the clergy subscribed liberally. David Bruce of Scotland was ransomed for 100,000 marks, and King John of France for £500,000, payable in instalments.—In modern warfare, where the fighting is performed by professional soldiers, pecuniary ransoms are scarcely ever resorted to, freedom being granted to prisoners in exchange for others of corresponding rank captured on the opposite side.

RA'NULA is the term applied to an encysted tumour, containing a glairy fluid, and lying under the tongue. The ordinary method of treating such tumours is by free incision, or by cutting out a piece of the sac; and if this is not sufficient to effect a cure, the interior should be touched with nitrate of silver, or a small seton should be passed through it, with the view of destroying it by suppuration. The name of the tumour is due to the supposed frog-like form which the swelling assumes.

RANUNCULA'CEÆ, a natural order of exogenous plants, mostly herbaceous, rarely shrubs, and generally natives of cold damp climates. Some are found within the tropics, but almost exclusively in very elevated situations. The number of known species is about 1000. They occur in all quarters of the globe, but most abundantly in Europe. The leaves are generally much divided, and have dilated sheathing stalks. The calyx is of 3—6 deciduous hypogynous sepals; the corolla of 3—15 hypogynous petals, in one or more rows, sometimes assuming very remarkable forms, as in larkspur, aconite, and columbine; rarely absent, in which case the sepals are gaily coloured. The stamens are usually numerous; the carpels are numerous, one-celled, sometimes united into a single many-celled pistil; the ovary with one or more ovules. The fruit either consists of dry achenia, or is berry-like or follicular.—Acridity is the prevailing character of the order, and the leaves of some species readily produce blisters; but this property disappears when they are dried or heated. Many are narcotic and poisonous; some are used in medicine, as aconite and hellebore. The seeds of *Nigella sativa* were formerly used instead of pepper. The fruit of the May Apple or Wild Lemon (*Podophyllum peltatum*) of North America may be eaten, but is very acid.—Many of the order produce flowers of great beauty, as some species of *Ranunculus* (q. v.), *Anemone* (q. v.), *Larkspur* (q. v.), *Pæony* (q. v.), *Columbine* (q. v.), *Clematis* (q. v.), &c.

RANU'NCULUS, a genus of plants of the natural order *Ranunculaceæ;* having five sepals; five petals, with a nectariferous pore at the base of each petal, often covered with a scale; many stamens situated on a receptacle, and germens



Garden Ranunculus.
(From a drawing by Holland.)

accumulated into a head. The species are numerous, herbaceous plants, mostly perennial. Some of them adorn meadows with their yellow flowers, familiarly known as *Buttercups;* others, known by the name of *Crowfoot*, are troublesome weeds in gardens and pastures. Many, as the Spearworts, are found chiefly in moist places, and some are altogether aquatic, covering the surface of ditches, ponds, and rivers, where the water is shallow, with a carpet of verdure exquisitely studded with beautiful white flowers.—One species, the ASIATIC R., or GARDEN R., exclusively the R. of florists, a native of the Levant, has been cultivated in Europe for almost 300 years. From clusters of small tubers it sends up several bipartite leaves, and an erect branched stem, with terminal flowers, which, in the cultivated varieties, are often double or semi-double, yellow, white, red of various shades, or of mixed colours, very brilliant, and from an inch and a half to two inches and a half in diameter. The cultivated varieties are extremely numerous. The R. is propagated by seed, by offset tubers, or by dividing the clusters of tubers. The roots are often taken

up in summer, after the leaves die, and kept in a dry place till the beginning of the ensuing winter or spring. Protection by frames and glasses, shading from strong sunshine, and other such means, are employed in order to increase the beauty of the flowers. The R. loves a free and rich soil.—Double-flowered varieties of some other species, with taller stems and smaller white or yellow flowers, are cultivated in flower-gardens, sometimes under the name of *Bachelors' Buttons*.—The acridity of many species of R. is such that the leaves, bruised and applied to the skin, produce blisters; and those of *R. sceleratus*, a pretty common British species, are said to be used by beggars to cause sores, in order to move compassion. *R. thora*, a Swiss species, is of extreme acridity, and hunters were accustomed, in former times, to poison darts and arrows with its juice. Water distilled from the leaves of *R. flammula*, a British species, with rather tall stem and ovato-lanceolate leaves, common by the sides of ditches, &c., is an active and powerful emetic, producing almost immediate vomiting, and capable of being used with great advantage in cases of poisoning.—Yet the leaves of *R. ficaria*—sometimes called *Pilewort* and *Lesser Celandine*, a very common British species, adorning hedge-banks with bright yellow flowers in spring—are capable of being used as a pot-herb. Pastures in which *R. acris*, *R. repens*, &c., are very abundant, are injured by them, and they ought to be diligently grubbed out; they are particularly supposed to give an unpleasant taste to milk and butter; but it is thought not improbable that a moderate mixture of these plants with the other herbage, is even advantageous, and that they may act as a condiment. Their acridity is lost in drying, and they are not injurious to hay. The small tubers of Pilewort, or Lesser Celandine, are used for the cure of hæmorrhoids; but their acridity also disappears when they are boiled, and they are then a pleasant article of food.

RANZ DES VACHES (in German, *Kuhreigen*), a name applied to certain simple native melodies of the Swiss Alps, which are usually sung by the herdsmen, and played by them when driving their herds to and from the pasture, on an instrument called the *Alphorn*, consisting of a wooden tube somewhat bent, about three feet long, widened out into a bell, and bound by a pitched cord. The associations of pastoral life recalled by these airs to the Swiss in foreign countries, have been said to produce that unaccountable longing for home, or *nostalgia*, which has been remarked among the Swiss soldiers abroad. The bands of the Swiss regiments in foreign service have, on this account, been prohibited from playing the Ranz des Vaches. The Emmenthal, Entlebuch, the Bernese Oberland, the Grisons, Appenzell, and other pastoral districts of Switzerland, have each their respective Ranz des Vaches. A collection of Ranz des Vaches, along with other Swiss melodies (*Sammlung von Schweizer Kuhreigen und Volksliedern*), was published at Bern in 1818; and these airs are also to be found in the *Allgemeine Schweizer Liederbuch*, 1851. The Ranz des Vaches of Switzerland are ruder in their character than the mountain melodies of the Tyrol, with which they are sometimes confounded.

RAPA'LLO, a maritime town of Northern Italy, province of Genoa, and 17 miles east of the city of that name, with 10,422 inhabitants. It was first called Tigulia. Its only object of interest is the Sanctuary of the Madonna, on the Monte Allegro, erected in 1557. R. is a thriving commercial town, and has manufactures of wax and of soap, and of laces in thread and in cotton; it has fisheries of coral and tunny.

RAPE, or **COLESEED** (*Brassica napus*; see BRASSICA), a biennial plant much cultivated both on account of its herbage and its oil-producing seeds. It is a native of Europe, and perhaps of England; but it is hard to say where it is truly indigenous and where naturalised. It is so nearly allied to *Brassica rapa* (Turnip), *B. campestris* (Swedish Turnip, Colza, &c.), *B. oleracea* (Kale, Cabbage, &c.), and *B. præcox* (Summer Rape), that botanical distinction is difficult, particularly as to some of the cultivated varieties. Dr Lindley gives the following synoptical view of the most characteristic differences of these species, in Morton's *Cyclopædia of Agriculture*

Leaves bright green, . . .	*B. rapa.*
Leaves glaucous—	
Leaves hispid when young, .	*B. campestris.*
Leaves never hispid—	
Siliques spreading, . .	*B. napus.*
Siliques erect—	
Calyx erect, . . .	*B. oleracea.*
Calyx spreading, . .	*B. præcox.*

The root of R. is slender, or in cultivation sometimes becomes carrot-shaped (see NAVEW), but it never becomes turnip-shaped. The stem is taller than that of the turnip, or Swedish turnip, and the foliage more luxuriant. The cultivation of R. is very general in many parts of the continent of Europe, from which it seems to have been introduced into England at least as early as the 16th c.; and in the 17th c., if not sooner, large quantities of oil were made from its seeds, chiefly in the fenny and other alluvial districts of the east of England, where also it has long been most extensively employed for feeding sheep. On the continent, it is not unusual to sow R. in order to *green-manuring*, ploughing its herbage into the soil, a mode of enriching land much more common in some parts of Europe than it is in Britain. R. delights in a rich alluvial soil, and is particularly suitable for newly reclaimed bogs and fens, in which the turnip does not succeed well; but it is also extensively cultivated in the chalk and oolite districts of the south



Rape (*Brassica napus*):
a, silique.

of England. The mode of cultivation does not differ much from that of turnip, and similar manures are used. In rich soils, R. sometimes attains a height of three or even four feet, so that the sheep turned in are hidden beneath the leaves, and seem to eat their way into the field. They eat the stalks even more greedily than the leaves. A too exclusive feeding on R. is, however, apt to produce diseases, which a sprinkling of salt, a supply of hay, &c., are found useful in preventing. When R. is cultivated

for seed, it is sown in autumn. When the seed is ripe, R. is cut with the sickle; and after a short time allowed for drying, the seed is thrashed out, when the haulm is often burned, a wasteful practice, as its decay affords more abundant and useful manure, and indeed cattle are fond of it as food. *Rape-cake*, the mass of seeds from which oil has been obtained by crushing, is used for feeding oxen and sheep, but is very inferior to linseed-cake, and some other kinds of oil-cake. Ground into dust, it is a very valuable manure. *Rape oil* is extensively used for machinery and for lamps; but the oil and cake so called are not exclusively obtained from this plant, nor are the names *Colza-oil* and *Rape-oil* used to discriminate the produce of different plants, although in some parts of Europe the name Colza is given to varieties of *Brassica campestris* and *B. oleracea*, which are cultivated in the same way as rape. *B. præcox* is also cultivated in some places, being sown in spring, and reaped in autumn. The seeds of other cruciferous plants are also crushed indiscriminately with these, and the oil and cake sold by the same names. See OILS.—The name *Rape* is from the same root as Ger. *reps*, and Lat. *rapa* (a turnip); *Cole-seed* and *Colza* from the same as *kale*.

RAPE is the crime of having carnal knowledge of a woman against her consent and by force. The essence of the offence is that force be used, and it is immaterial what is the age of the woman, and whether she is married or single, chaste or unchaste. The only difference caused by the habitual unchastity of the woman is that in such a case it is less easy to satisfy the jury that the element of consent was wanting. The two elements of rape are the carnal knowledge and the force used. As to the element of resistance on the part of the woman, or force on the part of the man, several niceties often occur in the application of the law, from the great variety of circumstances attending this crime. With regard to an idiot woman, it has been held that it is not necessary to prove resistance on her part, and that the crime may be committed though she made no resistance. If consent be extorted by fear and threats, or where several men join together, and resistance is useless, this is the same as using violence to overpower the woman. Where the woman is stupified by drink, so that the power of resistance is annihilated, it is the same as knocking her down. In a case, however, where force is used in the first instance, but the woman afterwards in some degree consents, the crime of rape will not be committed, though the evidence may establish the crime of assault. Some difficult cases have occurred with reference to married women who have been beguiled by men personating their husbands, and so been, in a certain sense, cheated out of their consent. But it has been repeatedly decided by a majority of the court, both in England and Scotland, that such an offence was not rape.

One of the important circumstances attending the crime of rape is the mode of proof, and in this respect it differs from other crimes. It is held to be all but essential, as a corroboration of the woman's story, that if her cries of resistance were not heard, at all events she should have, immediately after the offence, complained on the first opportunity to her friends or relations. It is not allowed to give in evidence the particulars of such complaint, but merely the fact that she made a complaint against some person. Unless this important particular be proved, her evidence is looked upon with great suspicion, and may be discredited by the jury, unless there were peculiar circumstances to account for the want of such complaint. One of the common defences to a charge of rape is the unchastity of the woman, the object being to render it unlikely that she did not consent, and hence it is in practice considered a proper question for the prisoner's counsel to put to her, whether she had not had connection with the prisoner before or with other men; but at the same time she is cautioned by the judge that she is not bound to answer such questions unless she likes. If, however, she denies the accusation, witnesses may be called to contradict her on that point.

The crime of rape is felony by the law of England, and is punishable by penal servitude for life, or for not less than three years, or by imprisonment not exceeding two years, with or without hard labour. Of late, attempts have been made to add flogging or corporal punishment to the other punishment, but bills having that object have been thrown out of parliament. There are several other crimes in the same category as rape, but punishable under separate enactments. Thus, the crime of having carnal connection with a girl under the age of ten years is felony, and punishable like rape. Whoever has carnal connection with a girl who is between the age of ten and twelve years, is guilty of a misdemeanour, and liable to penal servitude for three years, or imprisonment for two years with hard labour. Consent of the girl in these two cases is immaterial. The forcible abduction of women is divided into two offences. Wherever a woman of any age has property, and is forcibly taken away with intent to marry or carnally know her, the offence is felony, punishable by penal servitude of three to fourteen years, or two years' imprisonment. Again, if a girl, though having no property, is under the age of twenty-one, and is fraudulently allured or taken away out of the possession of her parents or guardians, with intent to marry or carnally know her, this is felony, punishable as in the preceding case. In order to the commission of the latter offence, an improper motive is necessary on the part of the man, but the consent of the girl is of no consequence.

RAPHAEL, or **RAFFAELLO SANTI** or **SANZIO**, called by his countrymen *Il Divino*, 'the Divine,' is ranked by almost universal opinion as the greatest of painters. He was born at Urbino in 1483, and in 1497, on the death of his father, Giovanni Santi, who was his first instructor, he was placed under Pietro Perugino, the most distinguished painter of the period, who was then engaged on important works in the city of Perugia. In 1504, R. visited Florence, and improved his style by studying composition and expression in the works of Masaccio, and colour and effect in those of Fra Bartolomeo. He seems to have lived in Florence till 1508, when he went to Rome, on the invitation of Pope Julius II. His celebrated frescoes in the Vatican and numerous important works were then commenced. Julius died in 1513; but his successor, Leo X., continued R.'s services, and kept his great powers constantly in exercise. The works of R. are generally divided into three classes: his first style, when under the influence of Perugino's manner; his second, when he painted in Florence from 1504 to 1508; and his third style, which is distinguishable in the works executed by him after he settled in Rome. Each of these styles has its devoted admirers. Those who incline to art employed in the service of religion, prefer the first manner, as embodying purity and religious feeling. His last manner, perfected when the taste for classical learning and art was strongly excited by the discovery of numerous valuable works of the classic period, is held by many connoisseurs as correctly embodying the highest art; while his middle or Florentine style is admired by

some as exemplifying his powers, freed from what they deem the rigid manner of Perugino, and untainted by the conventionalism of classic art. In all these different styles, he has left works of great excellence. 'The Coronation of the Virgin,' in the gallery of the Vatican, and 'The Spozalizio,' or Marriage of the Virgin, in the Brera Gallery at Milan, belong to the first period. The 'St Catharine,' in the National Gallery, London; 'The Entombment,' in the Borghese Gallery, Rome; 'La Belle Jardinière,' in the Louvre, to his second period. While the 'St Cecilia,' at Bologna; the 'Madonna di San Sisto,' at Dresden; 'The Cartoons,' at Hampton Court; 'The Transfiguration;' and all the Vatican frescoes, except 'Theology, or the Dispute on the Sacrament,' the first he executed on his arrival from Florence, are in his third manner, or that which peculiarly marks the Roman school in its highest development. R. died at Rome on April 6, 1520, the anniversary of his birthday.

RAPHA'NIA, or **ERGOTISM**, is a disease which was much more prevalent some centuries ago than it is at present. It is defined as 'a train of morbid symptoms, produced by the slow and cumulative action of a specific poison peculiar to wheat and rye, and which gives rise to convulsions, gangrene of the extremities, and death' (Aitken's *Science and Practice of Medicine*, 1858, p. 332). It has been described under various names. From the 10th to the 14th c., it was known as *St Anthony's Fire*, a title which has been since associated with erysipelas. It was then described as epidemic gangrene. The name *Raphania* was first given to it by Linné, who thought the morbid symptoms were dependent upon the mixture of *Raphanus Raphanistrum*, or jointed charlock, with the wheat used as food. It was suspected, as early as the end of the 16th c., that the disease was due to the development of a fungus on the grain, and this fact is now established beyond doubt, although some writers hold (like Linné) that this morbid state is also produced by the admixture of poisonous plants, especially *Lolium temulentum*, or darnel, being mingled with the grain. Although rye is the ordinary seat of the poisonous fungus, wheat, rice, and other grains are liable to be similarly affected, and to produce similar results. For an account of the fungus, see ERGOT.

There are two forms of the disease—the spasmodic and the gangrenous. The spasmodic form begins with tingling or itching of the feet and hands, and sometimes of the head. Violent contractions of the hands and feet, giving rise to intense pain in the joints, are a common symptom. The head is much affected, the patient complaining of drowsiness, giddiness, and indistinct vision. If coma or epileptic convulsions supervene, there is little hope of recovery. The appetite is usually enormous; spots like those of purpura appear on the face, and there are seldom any signs of improvement for some weeks. The gangrenous form begins with extreme lassitude, and is accompanied by some febrile disturbance. The extremities are painful, cold, almost insensible, and not readily moved; and after a varying time, gangrene supervenes.

With regard to treatment, the first thing to do is to replace the poisonous flour by easily digested, nourishing, wholesome food. The pain must be relieved by opiates, the blood purified by the administration of chlorate of potash, and the general tone of the system improved by tonics, such as the preparations of iron, bark, &c. In the spasmodic form, warm baths and gentle friction would probably prove serviceable. Whatever be the form of treatment adopted, the mortality in the gangrenous form is usually 90 per cent. The spasmodic form is much less destructive to life.

RA'PHIDES are crystals found in the interior of the cells of plants. The word is the plural of the Greek *raphis*, a needle, and was originally used to denominate crystals of an acicular form, which are often collected together in bundles. But crystals of various forms are found in the cells of plants, consisting chiefly of phosphate or of oxalate of lime. In many kinds of plants, they very much abound, and often in a particular manner in particular parts of plants. They are very minute, and are found in such delicate tissues as the petals of the Pelargonium.

RA'PIDAN. See RAPPAHANNOCK.

RA'PIER is said to have had distinct meanings at different times, and in ancient fencing to have been a long cutting broadsword; but for the last century at least, the rapier has been a light, highly-tempered, edgeless, thrusting weapon, finely pointed, and about 3 feet in length. It was for long the favourite weapon in duelling, and was worn by every gentleman. At present, it is worn only on occasions of court ceremonial, and answers no other purpose than to incommode the wearer. In war, a rapier could never have been of any service.

RAPIN DE THOYRAS, PAUL DE, a French historian of England, was descended from a Protestant Savoyard family, which settled in France in the 16th c., and was born at Castres, in Languedoc, March 25, 1661. He studied at the Protestant college of Saumur, and passed as advocate in 1679, but had no liking for the profession; and when the Edict of Nantes (1685) forced him to leave France, he sought employment first in England (where he was unsuccessful), and afterwards in Holland, where he enlisted in a corps of volunteers at Utrecht, formed by his cousin-german, Daniel de Rapin. With his company, he followed the Prince of Orange to England in 1688, was made ensign in the following year, and distinguished himself by his bravery at the siege of Carrickfergus, the battle of the Boyne, and the siege of Limerick, where he was shot through the shoulder by a musket-ball. In 1693, he was appointed tutor to the Earl of Portland's son, with whom he travelled in Holland, Germany, and Italy, after which he took up his residence at the Hague; but in 1707, withdrew with his family to Wesel, in the duchy of Cleves, where he devoted the remaining 17 years of his life to the composition of his great work. The severity of his labours is believed to have shortened his days. He died May 16, 1725. R.'s *Histoire d'Angleterre* was published at the Hague in 8 vols., the year before his death. It was undoubtedly, as Voltaire has said, the best work on English history that had until then appeared: full, minute, careful in citing authorities, clear, rapid and accurate in narration, methodical in the arrangement of its materials, comparatively impartial in spirit, and yet betraying on the part of the author an honourable reverence for law and liberty. R. begins with the invasion of Britain by the Romans, and ends with the death of Charles I. The work was continued to the death of William III. by David Durant (Hague, 2 vols., 1734). The best edition of the *Histoire* in its augmented form is by Lefebvre de Saint-Marc (Hague, 16 vols., 1749 *et seq.*). The original was translated into English by the Rev. Nicholas Tindal, M.A. (Lond. 15 vols., 1725—1731), and subsequently by John Kelly, barrister (in 2 vols. fol.).

RAPP, JEAN, Count, a French general, was born at Colmar, in the department of Haut-Rhin, France, 27th April 1773. He was intended for the church, but his taste for a military life led him to enrol himself (1788) in the mounted 'chasseurs' of the French

army. R. distinguished himself by dashing gallantry in Germany and Egypt, and on the death of Desaix at Marengo, he became aide-de-camp to Napoleon. His brilliant charge at Austerlitz upon the Russian Imperial Guard, which put the latter to a complete rout, was rewarded with the grade of general of division (24th December 1805). But R. joined to the utmost bravery and coolness, a quick and unerring judgment, which enabled him not only fully to comprehend Napoleon's plans, and execute to the spirit the duties intrusted to him, but also at times to amend and even disobey his orders with the happiest results. The latter was the case at Lobau, where R.'s disobedience decided the battle in favour of Napoleon; and for this service, he was named a Count of the Empire (1st August 1809). He opposed the Russian expedition with the utmost earnestness, but, notwithstanding, accompanied the Emperor throughout the whole of it, adding on many occasions to his own reputation and the glory of the French arms. His obstinate defence of Danzig for nearly a year against a powerful Russian army, placed him in a high position among military men; and his chivalrous and considerate treatment of the unfortunate inhabitants during the siege was so warmly appreciated by them, that they presented him with a magnificent sword enriched with diamonds. The Russians, contrary to the articles of capitulation, sent R. and his garrison prisoners to Russia, and he did not return to France till July 1814. On reaching Paris, he was well received by Louis XVIII.; and in March 1815 was one of those appointed to oppose the return of Napoleon, but deserted, along with his troops, to his old master, and was appointed commander-in-chief of the army of the Rhine (16th April), and peer of France (2d June). After Waterloo, R. again submitted to Louis, but retired to Switzerland for two years, returning in 1817, and receiving a full pardon in the following year. He was re-created a peer of France (5th March 1819), and held various offices about the court; but broken in health by constant hard service and numerous severe wounds, he died at Paris, 8th November 1821. A volume of Memoirs (1823, in 8vo) has been published under his name.

RAPPAHA'NNOCK, a river of Virginia, formed by the union of the North Fork and the Rapidan, which rise in the Blue Ridge of the Alleghany Mountains, and flow eastwardly to their point of union, 40 miles above Fredericksburg, where the falls afford water-power. The river is navigable from this point south-east to Chesapeake Bay, which it enters by a broad estuary, 70 miles long. The R. and Rapidan have been the scenes of some of the most sanguinary battles of the War of Secession, at Fredericksburg, Chancellorsville, and the Wilderness.

RAPPAREE', a wild Irish plunderer, so called from his being generally armed with a *rapary*, or half-pike. The term was in common use in the 17th century. See *Notes and Queries*, August 17, 1861.

RAPPEE', a coarse-grained species of SNUFF (q. v.). The word is of French derivation, and arose from this species of snuff being manufactured from dried tobacco by means of the *râpe* or *raspe*, an instrument by which the thin parts of the leaf were cut from the veins and fibres, the latter alone being used in the manufacture of rappee.

RA'PPEN, a small Swiss coin, made of an alloy of copper and tin, forming the $\frac{1}{100}$th part of the modern Franc (q. v.), and therefore equivalent to the French centime. The old Swiss franc (= about 1*s.* 2*d.* sterling) was also divided into 100 rappen. The rappen was first coined at Freiburg, and took its name from the head of a raven (Ger. *rabe*, pronounced in some parts *rape*) impressed upon it.

RAPTO'RÉS. See ACCIPITRES.

RARATO'NGA. See COOK ISLANDS.

RAS (= Heb. *rosh*), an Arabic word, signifying 'head,' 'promontory,' occurs in the names of many capes on the Arabian and North African coasts, and also in Sicily and Malta; as Rasigelbi (corrupted from Rasi-calbo) 'the dog's cape,' on the north coast of Sicily; Ras-el-Abyad, 'white cape,' on the coast of Palestine; Ras Bab-el-Mandeb, 'cape of the gate of tears,' at the Strait of Bab-el-Mandeb; Ras-el-Jezirah, 'cape of the peninsula;' Ras-el-Had, the eastern point of Arabia.

RASHES, affections of the skin, characterised by a red superficial efflorescence, diffused or in patches, disappearing under pressure, and usually ending in desquamation. To this division of cutaneous disorders belong Rubeola (or Measles), Scarlatina (or Scarlet Fever), Erysipelas (or St Anthony's Fire), Erythema, Roseola (or Scarlet Rash), and Urticaria (or Nettle Rash). Of these rashes, Rubeola, Scarlatina, and Erysipelas are rather to be regarded as fevers or blood diseases, than as cutaneous diseases, in the true sense of the phrase.

RASHI (i. e., Rabbi Solomon [Shelomo] Izaaki, or Ben Izaak, often erroneously called Jarchi), the greatest Jewish commentator and exegete, was born about 1040, in Troyes, in France. The range of his studies was as extraordinarily wide as were his early developed faculties brilliant, and his industry and perseverance enormous. Philology, philosophy, medicine, astronomy, civil and canonical law, exegesis, were the chief branches of his learning; and to a rare proficiency in them, he united a complete mastery over the whole range of Scripture and the Talmudical sources. In order further to perfect himself for his gigantic task, he travelled for seven years, visiting the academies of Italy, Greece, Germany, Palestine, Egypt, where he sat at the feet of the great masters of the age, collecting their sayings and legal decisions. His chief work—and one universally recognised as the principal work of all Scriptural exegesis—is his Commentary to the whole of the Old Testament. Up to this day, it has not been superseded by any other, although in the province of philology and antiquities, investigation has been much furthered since his time. R.'s style is extremely brief and concise, yet clear and pregnant; obscure and abstruse (as it has been pronounced by some) only to those who lack the necessary preliminary knowledge. According to the fashion of its day, it is replete with allegorical or rather poetical illustrations, gathered from the wide fields of the Midrash within and without the Talmud; and many a passage is thus preserved to us, which, in the disordered state of those manuscripts, would probably otherwise have been lost. This Commentary—entirely translated into Latin by Breithaupt, and partly also into German—was the first book ever printed in Hebrew (Reggio, 1474), and has since been reprinted with almost every complete edition of the Hebrew Bible. Of his numerous other works is first to be mentioned his Commentary to 23 treatises of the Talmud, supplemented after his death by his grandson, Samuel ben Meier; further, a Commentary to the Pirke Aboth; the *Pardes*, treating of Laws and Ceremonies; a Collection of Legal Votes and Decisions;

a Commentary to Midrash Rabbah; a Book of Medicine; a Poem on the Unity of God, &c., &c. He died about 1105; and such was his piety and his surpassing eminence, that later generations wove a shining garland of legends around his head. The confusion of R. with two Jarchis, who lived long after him, has not hitherto been properly accounted for. They bore that surname because they were born at Lunel, Jerach being the Hebrew for moon, *Lune* in French.

RASK, RASMUS CHRISTIAN, a distinguished Danish philologist, was born at Brendekilde, near Odense, in the island of Fünen, 22d November 1787, studied at Copenhagen, and in 1808 published his first work, *Vejledning til det Islandske eller gamle nordiske Sprog* (Rules of the Icelandic Language or the Ancient Language of the North). During the years 1807—1812, he occupied himself with drawing up grammatical systems for most of the Germanic, Slavic, and Romanic tongues, and in comparing them with those of India. He then visited Sweden, where he commenced to study Finnish; and in 1813 proceeded to Iceland, where he lived for two or three years, perfecting his knowledge of the language, the history, and the sagas of the inhabitants. On his return to Copenhagen, he was appointed sub-librarian to the university; and in 1818 published a splendid work, *Undersøgelse om det gamle nordiske eller Islandske Sprogs Oprindelse* (Researches concerning the Origin of the Icelandic or Ancient Language of the North), which led Grimm to his famous discovery of the displacement of consonants in the Teutonic languages. Previous to this, however, he had resolved to visit Asia; and after spending a year (1817) in Stockholm, where he published his admirable *Angelsaksisk Sproglaere* (Anglo-Saxon Grammar), and the first critical and complete edition of the two great monuments of Scandinavian mythology, the *Snorra Edda* and the *Edda Saemundar*, he went to St Petersburg, where he devoted himself for two years, with intense eagerness, to the study of the oriental languages, principally Sanscrit, Persian, and Arabic, but not failing to acquire, at the same time, a competent knowledge of Russian and Finnish. Thus equipped, he proceeded to Astrakhan, where he stayed six weeks, to study the language of the Tartars, and then commenced a journey through the country of the Turkomans, the Caucasus, Persia (where he added the Mongol and Mantchu dialects to his already enormous linguistic acquisitions), Hindustan (cultivating in the last-mentioned country the society of learned Brahmans, and visiting all their great schools), and finally Ceylon, where he made himself acquainted with Cingalese and Pali, and wrote his *Singalesisk Skriftlaere* (Colombo 1822). In 1823, R. returned to Copenhagen, laden with learning and rare manuscript treasures, of which the greatest part was presented to the university. In 1825, he was appointed Professor of 'Literary History,' and in 1828, of Oriental Languages. Next year, he was made chief custodier of the university library; and in 1831, Professor of Icelandic. But his immense labours had exhausted his energies, and he died 14th November 1832, at the early age of 45, a victim of hard work. Besides the productions already mentioned, R. wrote *Frisisk Sproglaere* (Cop. 1825); *Den gamle Aegyptiske Tidsregning* (The Ancient Egyptian Chronology, 1827); *Den aeldeste Hebraiske Tidsregning* (The Oldest Hebrew Chronology, 1828); besides grammars of several languages, and a great number of miscellaneous articles in the learned journals of the North, which were collected after his death, and published (Cop. 3 vols. 1834—1838), together with a life by Petersen.

RASKO'LNIK (Russ. *separatist*), the name of a variety of sects in the Russian Church, which date from an early period, and must be regarded rather as a general designation of dissenters from the established church of Russia, than as a description of any specific form of doctrinal belief. Such dissent is traceable from the very earliest period of the distinct organisation of the Russian Church. A monk, named Andrew, in 1003; another, called Demitry (Demetrius), in the 12th c.; an Armenian monk, named Martin, who was burned as a heretic at Constantinople in the end of the same century; Leo, Bishop of Rostow in the beginning of the 14th, and Strigolnik and Nikita towards its close—are all mentioned as having originated or propagated heresies of various kinds. A still more remarkable and more formidable organisation—a form of Crypto-Judaism—was introduced in the 15th c. by a concealed Jew, called Zacharias, who succeeded in gaining many followers. One of these, called Zosima, is particularly noticeable, as having obtained much popularity, and even managed to have himself elected metropolitan of Moscow. His sect, which studiously concealed itself wherever this concealment seemed necessary, was condemned by a synod (1490), and repressed with great rigour; but it continued to maintain a concealed and precarious footing, and is said to possess disciples even to this day, especially in the government of Irkutsk, under the name of Selesnewschschina. A sect, whose leading principles were borrowed from the German reformers, was founded in 1553 by Matthias Baschkin; but it was condemned at a synod in Moscow, and does not appear to have taken much hold on the people.

But it is from the middle of the 17th c. that—the separation of the sects from the national church having become more tangible, from its involving nonconformity with the established worship—the designation of R. finds its fullest application. At that period, a complete revision of the ancient Slavonic liturgical and ritual books, which had suffered grievously from the ignorance, and probably also from the heterodoxy of transcribers, was undertaken by the Patriarch Nikon. See PHILIPPINS. The revised books were introduced into the churches by the authority of the czar as well as of the patriarch; but many of the clergy and people resisted the innovation, and refused the new liturgies. Foremost among the recusants, or nonconformists, were those who had already been sectaries upon other grounds; but all differences were to some extent merged in the common ground of protest, and all were known under the common appellative Raskolniks.

In later Russian history, the Raskolniks are sometimes called by the name, which they themselves affect, of Starowierzi ('Men of the Old Faith'), or Prawaslawnuje ('orthodox'). Each sect has its specific doctrinal peculiarities; but most of them follow certain common observances, in which lies their tangible difference from the national church. They cross themselves with the first and middle finger, and not with the first three fingers; they use only the unrevised service-books; they repeat Halleluiah only twice; in church ceremonies, they turn from left to right, and not from right to left; they use seven and not five altar-breads in the Eucharistic offering; they pay worship only to ancient pictures, or those painted by themselves; they use an eight-pointed instead of the ordinary cross; they attend only their own churches, and hold no communion of worship with the members of the national church; they never shave or cut their hair, and adhere strictly to the old Russian costume.

They may be divided, in general, into two classes —those which have popes (priests), and those who do not recognise the priestly order. The former are in every respect more moderate and more free from fanaticism than the Raskolniks who discard the ministry of priests. Their priests, however, have often been outcasts of the orthodox church, who betook themselves to the rival communion. The most notable among the Raskolniks of this class are those called the Peremasanowschtina, who re-ordain all popes joining their communion; the Jowlewschtschina, who are said to permit freedom of divorce and exchange of wives; Dositheowschtschina, so called from their founder, a monk named Dositheus; and Tschernobolzi, whose chief distinction consists in refusing to take an oath, and to say the prayer for the emperor prescribed in the liturgy. Of the non-popish Raskolniks, the chief are the Philippins (q. v.), the Pomoraenians or Rebaptisers, the Theodosians—an offshoot of the Pomoraenians—and a sect of mystic spiritualists with strong Protestant and rationalistic leanings, called Duchoborzen. A curious development of the R. movement is found in the Samokrischtchina (Self-baptisers) and the Samostrigolschtschina (Self-ordainers), among whom each one administers baptism to himself, each priest ordains himself, and each monk or nun performs the ceremony of his own consecration without the interposition of the regular ministry. It may be added, in conclusion, that with a considerable proportion of these various sectaries, there is found largely mixed up with religious fanaticism an element of communism and of disaffection towards the reigning dynasty, or, more properly, towards the established order of things. The latter may be in part explained by the rigorous measures of repression under which the Raskolniks have suffered for many successive generations. The former is an ordinary accompaniment of the sectarianism of the poor, especially those of the peasant class, and still more of the serf population.

RA'SPBERRY (*Rubus Idæus*), the most valued of all the species of Rubus (q. v.). It has pinnate leaves, with 5 or 3 leaflets, which are white and



Raspberry (*Rubus Idæus*).

very downy beneath, stems nearly erect, downy, and covered with very numerous small weak prickles; drooping flowers, and erect whitish petals as long as the calyx. The wild R. has scarlet fruit, and is found in thickets and woods throughout the whole of Europe and the north of Asia. It is common in Britain. The R. has long been in cultivation for its fruit. There are many cultivated varieties, with red, yellow, and white fruit, much exceeding the wild kind in size. The stem in a wild state is 3—4 feet high; in cultivation, 6—8 feet or upwards. Some of the cultivated varieties are also more branching than is common in a wild state, the stem of the wild plant being simple or nearly so. The root is creeping, perennial; the stems only biennial, bearing fruit in the second year, woody, but with very large pith. Plantations of raspberries are most easily made by means of suckers. The R. loves a light rich soil, and is rather partial to a shady situation. The tall kinds are unsuitable in situations much exposed to winds, as the stems are easily broken. The rows are generally about 4 feet apart, the plants 3 to 4 feet apart in the rows. The young stems are thinned out to allow free access of air to those which are left. Stakes are often used to support the stems, or they are variously tied together. The fruit is used for dessert; for jams, jellies, &c.; for making or flavouring many kinds of sweetmeats; and mixed with brandy, wine, or vinegar, for the preparation of *R. Syrup*, *R. Vinegar*, &c. Different preparations of it are used in medicine in cases of fever, inflammation, &c. R. vinegar is a particularly grateful and cooling drink in fevers. Raspberries, fermented either alone or along with currants and cherries, yield a strong and very agreeable wine, from which a very powerful spirit can be made.—Some of the other species of *Rubus*, most nearly resembling the R., produce also agreeable fruits. *R. odoratus* is a highly ornamental shrub, a native of Canada and the northern states of America, is frequent in gardens both in Europe and America, but rarely produces its fruit in Britain.

RASPBERRY VINEGAR, a culinary preparation, consisting of raspberry juice, vinegar, and sugar. It is best made by putting carefully gathered and very ripe raspberries into jars, and when as full as they will hold of the fruit, fill up the jar with good vinegar; after eight or ten days, pour off the vinegar, and let the fruit drain for some hours. The mixture of vinegar and juice thus obtained is added to another quantity of fruit, and treated in the same way. This is sometimes repeated a third time, and then the liquid is gently boiled for about five minutes with its own weight of refined sugar. Added to water, it forms a most refreshing summer drink, and is a useful cooling drink in sickness.

RA'STADT, a town of Baden, and, since 1840, a strong fortress of the Germanic Confederation, stands on the river Murg, 3 miles from its junction with the Rhine, and 15 miles south-west of Karlsruhe. It is a station on the Mannheim, Basel, and Waldshut Railways. From 1725 to 1771, the town was the residence of the Markgrafs of Baden-Baden. Steel wares, weapons, and tobacco are manufactured. R. is memorable for two congresses —the former in 1714, when a treaty of peace, which brought the war of the Spanish Succession to a close, was signed between Marshal Villars and Prince Eugene; and the latter in 1799. On the breaking up of the congress of 1799 without any definite result, the three French plenipotentiaries set out for Strasbourg on the evening of April 19; but they had scarcely got beyond the gates of R., when they were attacked by a number of Austrian hussars; two of the three were slain, and the third sabred, and left for dead in a ditch. The papers of the legation were carried off, but no further spoil was taken. This flagrant violation of the law of nations roused the indignation and horror not only of France, but of all Europe. The instigator and conductor of the assault remains still unknown. Pop. 9000.

RAT, the popular name of all the larger species of the genus *Mus*. See MOUSE. Two species are particularly deserving of notice, the only species found in Britain, or, indeed, in any part of Europe, and both very widely distributed over the world: the BLACK RAT (*M. rattus*) and the BROWN RAT (*M. decumanus*). Extremely abundant as these animals now are, their introduction into Europe—which, if at all through human agency, was unintentionally so—took place within recent times. Neither of them was known to the ancients. Both appear to be natives of the central parts of Asia, where other nearly allied species are also found. The black rat found its way to Europe about the beginning of the 16th c.; the brown rat first appeared at Astrakhan in the beginning of the 18th c., and reached Britain and the western countries of Europe about the middle of the century. The Jacobites of Britain were accustomed to delight themselves with the notion that it came with the



Black Rat (*Mus rattus*); Brown Rat (*Mus decumanus*).

House of Hanover, and chose to call it the *Hanoverian Rat*. It also received the name of *Norway Rat*, from a belief, unquestionably erroneous, that it was introduced from Norway, a country which it did not reach until long after it was fully established in Britain.

These two species are like one another, and very similar in their habits. The brown rat is the larger and more powerful of the two, and has waged war against the other with such success as to cause its total, or almost total, disappearance from many places where it was once very abundant; so that in many parts of Britain, where the black rat was once plentiful and troublesome, it would now be difficult, perhaps impossible, to obtain a single specimen. Rats, when pressed by hunger, do not scruple to devour the weaker even of their own kind. The extirpation of the black rat does not, however, always follow from the introduction of the brown rat, each probably finding situations more particularly suited to itself. In their native regions, they exist together; and in some parts of Europe the black rat is still the more plentiful of the two. Both infest ships, and are thus conveyed to the most distant parts of the world, some of them getting ashore at every port, and establishing new colonies, so that they are now common—and particularly the brown rat—almost wherever commerce extends.

The black rat is nearly seven inches and a half in length, exclusive of the tail, which is almost eight inches long. The brown rat attains a length of more than ten inches and a half, with a tail little more than eight inches long. Besides its larger size and comparative shortness of tail, it differs from the black rat in its smaller ears and less acute muzzle, as well as in its lighter colour and shorter hair. The tails of both are covered with a multitude of rings of small scales.

Both species are extremely prolific, breeding at a very early age, several times in a year, and producing from 10 to 14 at a birth. The excessive increase of their numbers, where abundant food is to be found, and there are few enemies to interfere with them, is thus easily accounted for. They sometimes multiply amazingly in ships; and perhaps nowhere more than in the sewers of towns. But in the latter situation, they really render good service to the promotion of public health, acting as scavengers, and devouring animal and vegetable substances, the putrefaction of which would otherwise be productive of pestilence. Such, indeed, seems to be the great use of the rat in the economy of nature; and it is perhaps worthy of notice, that the visits of the plague to Western Europe and to Britain have ceased from the very time when rats became plentiful. The brown rat, inhabiting sewers, is generally larger, fiercer, and of coarser appearance than the same species in houses or barns. Rats are also often found inhabiting burrows in dry banks, near rivers, &c. They feed indiscriminately on almost any kind of animal or vegetable food; they make depredations in fields of grain and pulse, from which they often carry off large quantities to be stored in their holes; they devour eggs; they kill poultry, partridges, &c.; they make most unwelcome visits to dairies and store-closets; and they multiply enormously in the vicinity of slaughter-houses and knackers' yards, which afford them great supplies of food. Their strong rodent teeth enable them to gnaw very hard substances, such as wood and ivory, either for food, or in order to make their way to more tempting viands.

They are creatures of no little intelligence. Many curious stories are told of the arts which they employ to attain desired objects, of the readiness with which they detect the approach of danger, and the skill with which they avoid it. Their sense of smell is very acute, and the professional rat-catcher is very careful that the smell of his hands shall not be perceived on the trap. They are very capable of being tamed, and have in some instances proved interesting pets.

The flesh of rats is eaten, but only by rude tribes, or when food is scarce. The skin is used for making a fine kind of glove-leather.

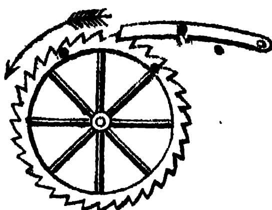
The name rat is often popularly given, not only to species nearly allied to these, but to other species of *Muridæ*, now ranked in different genera, some of which are noticed in other articles.

RAT, WATER. See VOLE.

RATAFI'A, the generic name of a series of cordials, prepared usually by mixing an alcoholic liquor with the juice of some fruit or some flavouring material, and sugar or syrup. The name is of French origin, and is said to have been given in consequence of the former habit of preparing a choice drink to be used at the ceremony of *ratifying* a treaty. A favourite flavouring for ratafias is the almond—hence, bitter almonds, cherry, peach, apricot, plum, and other similar kernels, are much used, and hence small almond-flavoured cakes are called ratafia cakes; but many other flavours are used, as orange flowers, gooseberries, raspberries, aniseed, angelica stalks; chocolate; black currants, coffee, &c.

RATCH, or **RATCHET**, in Machinery, is a small piece of metal, so placed with one end on a pivot, that the other can fall into the teeth of a wheel, as in the fig. Being perfectly free to move up and down, its own weight makes it drop into tooth after

tooth as the wheel revolves. But, as will be seen from the peculiar shape of the teeth, which have the form of an inclined plane on one side, and a perpendicular face on the other, the wheel can only revolve in the direction of the arrow.


Ratch.

RATE, or ASSESSMENT, is a money payment levied upon the owners or occupiers of real property, in respect of some benefit to such property, or in discharge of some legal liability attaching to it. The power of rating proprietors or tenants of lands is a power not existing by the common law of England, except for the repair of the parish church or of the parish highways; for poor rates, county rates, &c., are all authorised by some statute or statutes. A rate is in the nature of a local tax, and therefore so far contrary to the law, that clear authority must always be shewn for levying it. Hence, whenever a statute prescribes the conditions under which a rate may be imposed, it invariably states by whom the rate is to be made, and how it is to be enforced, and what appeal is to be allowed in case of an individual being aggrieved. These conditions must all be strictly complied with to the letter, otherwise the party rated can raise objections, and resist the rate. It may be said to be a general rule, that all rates must be so entitled that the parties rated are informed even by its heading whence the authority is derived. It is almost an invariable rule that the payment of rates is enforced in a summary way by justices of the peace, and this is one of the chief functions performed by justices. The mode in which this is practically done is by the party who has power to rate, or the agent or collector, applying to the justices for a summons, calling on the ratepayer to pay it. If payment is refused or neglected, application is next made for a distress-warrant to enforce payment, which means, if the payment is not made forthwith, or within a short specified time, the constable may seize the goods and chattels of the ratepayer, and sell them to make up the amount; and if there are no goods to seize, the party may be imprisoned for a specified time. As a general rule, imprisonment is only allowed after all means of recovering the rate by distress or seizure of the goods have failed. Owing to the strictness with which the machinery of rating must be carried on as directed by the statute, the ingenuity of the ratepayers, whetted by the natural indisposition of mankind to pay taxes, constantly prompts them to detect flaws in the proceedings, and litigation in various shapes is thereby produced throughout the country. As a new rate is almost invariably made every year, and sometimes every half year, constant opportunities for displaying this spirit of resistance are afforded.

RA'TEL (*Mellivora*), a genus of quadrupeds of the Bear family, *Ursidæ*, nearly allied to the Gluttons (q. v.), from which it differs in having one false molar less in each jaw, and the upper tubercular teeth slightly developed. The general aspect is similar to that of the badgers, but heavier and more clumsy. Two species are known, one of which, the CAPE R. (*M. Ratel* or *Capensis*), inhabits the south of Africa, and is said to feed much on bees and their honey, its thick fur protecting it against their stings; the other inhabits the north of India, prowls about by night, is a voracious devourer of animal food, and often scratches up recently interred bodies from their graves. The Cape R. is about the size of a badger; gray above, black below. It is easily tamed, and is amusingly active in confinement, continually running about its cage, and tumbling strange somersaults to attract the attention of spectators, from which it seems to derive great pleasure.


Ratel (*Mellivora Ratel*).

RATEL-I-COUM, a Turkish sweetmeat, which has lately become common in confectioners' shops under several names, but chiefly that of 'Lumps of Delight.' Its composition is starch and syrup, sometimes coloured. It is imported in the form of small cakes, about an inch thick and one or two inches square, and evidently cut from a mass. These pieces have been sprinkled with powdered white sugar, to prevent them from sticking together in the small boxes in which they are packed.

RA'THENAU, a small manufacturing town of Prussia, in the province of Brandenburg, on the right bank of the Havel (here crossed by a stone bridge), 45 miles west-north-west of Berlin. It consists of two portions, one old, and surrounded by walls, and the other new. Weaving, spinning, and brick and tile making are carried on, and there is a large factory for making spectacles, which employs 100 workmen. Pop. (1862) 6638.

RATHKEA'LE, a market and post-town of the county of Limerick, Ireland, situated on the river Deel, 17 miles south-west of Limerick. R. is a place of some inland commerce, but possesses no manufactures of any note. It is remarkable as a chief centre of the Palatine settlers introduced into Ireland soon after the close of the Jacobite war. Several of the families still remain in the district. The population in 1861 numbered 2761, of whom 2599 were Catholics.

RATHLI'N, ISLAND OF, an island 6½ miles in length by 1½ miles in breadth, in the barony of Carey, county of Antrim, Ireland, 6½ miles distant from the coast at Ballycastle, lat. 54° 36′ N., long. 9° 15′ W., supposed to be the Ricinia of Ptolemy, and Ricnia of Pliny, and called variously by later writers Rachri, Raghlin, and Ragheren, or Ragh Erin, fortress of Ireland. R. has been known in history since the days of the first religious migrations of the Irish monks under Columba; it was the scene of more than one struggle in the Danish wars, and it afforded shelter, after his defeat in Scotland, to Robert Bruce. In 1558, the Scottish colony which then inhabited the island was attacked by the Lord-deputy Sussex, and expelled from the island with such slaughter, that in 1590 R. was said to be entirely uninhabited. The geological formation of R. is basalt with limestone, and on the east side the basalt takes a columnar form, similar to that of the Giants' Causeway on the Irish, and of Staffa on the Scottish shore. The soil is

light, but in the sheltered valleys productive. Formerly, a considerable industry existed on the island in the manufacture of kelp; but since the cessation of that trade (see KELP) the population, which in 1841 amounted to 1039, had at the census of 1861 been reduced to 453.

RATIBOR, a town of Prussia, in Upper Silesia, stands on the left bank of the Oder, 44 miles south-south-east of Oppeln. It is a walled town, and a station on the Breslau and Vienna Railway. Pop. (1862) 11,794, who are employed in the manufacture of hosiery, woollen and linen fabrics, and tobacco.

RATIFICATION is a legal term used in the law of Scotland to denote the acknowledgment made by a married woman apart from her husband, and before a justice of the peace, that a deed executed by her is voluntary, and made with full knowledge of its legal effect. In this sense, the term corresponds to what is technically called in England an acknowledgment by a married woman. With regard to minors, the term is also technically used to denote the kind of confirmation or approval given by a person arrived at majority to acts done by him during minority, and which has the effect of conclusively establishing the validity of the act, which would otherwise be voidable.

RATING OF MEN, in the Navy, signifies the grade in which the man is entered on the ship's books; as, rated a petty officer, rated an able seaman, &c.

RATINGS of ships are divisions made by the Admiralty of all ships in the British navy into classes, by which certain allowances, the complement of officers, and other arrangements, are regulated. Ratings differ from time to time as the general size of the vessels increases. The classification at present (1865) is as follows: 1. Rated ships. *First-rates*—all ships carrying 110 guns and upwards, or 1000 men and upwards. *Second-rates*—one of the Queen's yachts; all ships above 80 guns and under 110, or with crews of from 800 to 999 men. *Third-rates*—the Queen's other yachts; all flag-ships or guard-ships (not of higher rates); all ships of 60 to 80 guns, or carrying 600 to 799 men. *Fourth-rates*—all frigate-built ships carrying from 410 to 600 men. *Fifth-rates*—all ships of from 300 to 400 men. *Sixth-rates*—all other ships bearing captains. 2. Sloops—comprising all vessels bearing commanders, and having the principal armament on one deck in broadside ports. 3. Gun-vessels—all vessels having and carrying their principal armament on one deck amidships. 4. All other ships and smaller vessels commanded by lieutenants.

RATIO. See PROPORTION.

RATION, in the Army and Navy, is the allowance of provisions granted to each officer, non-commissioned officer, soldier, or sailor. The army ration at home is ¾ lb. of meat, and 1 lb. of bread ('best seconds') if in barracks, or ¾ lb. of meat with 1½ lb. of bread if in camp. For this ration the pay of the recipient is subject to a fixed daily stoppage of 4½d. Abroad, the ration is 1 lb. of bread, or ¾ lb. of biscuit, and 1 lb. of fresh or salt meat, except at certain stations, where, for climatic reasons, a different ration is specially provided. The bread ration may be increased during operations in the field, though not above 1½ lb. of bread or 1 lb. of biscuit. During active operations, the officer commanding may direct the issue, in addition to the above, of wine, spirits, or any other article of subsistence equivalent thereto. The stoppage for this foreign ration is 3½d. The families of soldiers accompanying them abroad are allowed the following rations: the wife (married under regulations), half a ration; each legitimate child under 7, a quarter ration; from 7 to 14, a third part of a ration. When officers receive a colonial allowance in lieu of rations in kind, each is subjected to a daily stoppage of 2½d. A ration of forage at home consists of 10 lbs. of oats, 12 lbs. of hay, and 8 lbs. of straw for each horse. Cavalry soldiers receive this without stoppage; but their officers suffer a deduction of 8½d. per ration. Staff-officers and mounted officers of infantry provide their own forage, and are granted a pecuniary allowance to enable them to do so; the amount of this allowance is fixed half-yearly by the Secretary of State for War with reference to the market-price of fodder; it averages 2s. a day.

The full navy ration consists of the following articles: Daily—1¼ lb. of ship-biscuit, or 1½ lb. of soft bread, ¼ pint of spirit, 2 oz. sugar, 1 oz. chocolate, ¼ oz. tea; 1 lb. fresh meat, and ½ lb. of fresh vegetables, when these are procurable; otherwise, 1 lb. salt pork, with ½ pint split pease, or 1 lb. of salt beef, with 9 oz. flour, ¾ oz. suet, and 1½ oz. of currants or raisins. On alternate salt beef days—2 oz. preserved potatoes. Weekly—½ pint oatmeal, ½ oz. mustard, ¼ oz. pepper, ¼ pint vinegar.

The sailor's ration is issued free of any stoppage.

RATIONALISM (Lat. *ratio*, reason) strictly signifies that method of thought which in matters of religion not only allows the use of reason, but considers it indispensable. The term has now, however, acquired a wider meaning, and stands in opposition to *Supranaturalism*, or the belief in that which either transcends, or, as others view it, contradicts, both nature and reason—as, for example, miracles. To comprehend rightly the struggle between Rationalism and Supranaturalism, in modern Protestant theology, one must look at it from a historical point of view. The German and Swiss divines, in maintaining their polemic against Roman Catholicism (after the original enthusiasm of the Reformation had cooled down), took their stand on the absolute authority of the Bible as a purely divine book, containing no admixture of error of any kind, either in form or substance—the very vowel-points of the Hebrew (an innovation long posterior even to Christianity) being expressly held to be inspired. This, the oldest and most stringent kind of Protestant orthodoxy, gradually fell to pieces, partly on account of its unscientific character, and partly because it was demonstrated that the Bible itself put forth no pretensions to such infallibility. The first concessions to Rationalism were the admissions that the biblical writers differed in regard to their style and literary merit; next (as a logical inference from the foregoing), that they exercised a certain amount of independent power in the composition of their works. But gradually other points were assailed, some of which have been surrendered, while others are still tenaciously held; as that, in matters of physical science, the sacred writers spoke according to the conceptions and beliefs prevalent in their age, and not according to any supernatural enlightenment; that, on historical points, their information might be either erroneous or defective, or both; that they might err in anything except religious doctrine or sentiment; finally, that they might err in such too, and that the Bible is not the 'Word of God,' but only contains that 'Word,' which it is the province of human reason to discover, and to separate from whatever accretions of fable, myth, symbolism, or error have grown over it through the agency of man or the lapse of time. This is properly the theological Rationalism of modern times, and is held in Germany, France, Holland, England, and America by

many divines, who, nevertheless, look upon themselves as essentially Christian in their creed. But as most investigators that proceed so far, take yet a further step, and deny the presence of any element other than human in the Bible, or that there is any satisfactory evidence of the truth of its alleged supranaturalism, the word Rationalism has, in vulgar parlance, come to be synonymous with infidelity. It may also be added that the term Rationalism is also employed in a restricted sense to denote the method of substituting for the miraculous and supernatural in Scripture, something considered reasonable—e. g., the miracle of the crossing of the Red Sea is explained by the hypothesis that the Israelites crossed when the tide was out, while the Egyptians, hurriedly pursuing them, were taken in the returning waters. The leader of this school was *Paulus* (q. v.), whose system, after a time, gave way to the more scientific mythical theory of Strauss (q. v.).

RATIOS, Prime and Ultimate. There can be little doubt that Newton discovered by means of fluxions, of which he was in possession at a very early age, the greater part of that extraordinary series of theorems regarding motion, &c., which he first published in the *Principia*. He had, however, a great partiality for the synthetic form of demonstration, employed with such success by the Greek geometers; and the consequence was that, in the *Principia*, he avoided entirely the use of analysis by fluxions, and invented for synthetical applications the closely allied method of Prime and Ultimate Ratios. The fundamental idea involved in fluxions, prime and ultimate ratios, and the differential calculus, is the same, that of a *Limit* (q. v.).

To give an idea of the nature, as well as to shew the origin of the name, of the method, we may take a very simple case. Let a particle be projected in the direction AP; it will move uniformly in that line for ever, unless deflected from it by some external force. See Motion, Laws of. Suppose that gravity alone acts upon it, then (see Projectiles) it will describe a parabolic path, AQ, to which AP is the tangent at A; and the line PQ, which joins the disturbed and undisturbed positions of the particle at any instant, is vertical. Now, the lengths of AP and AQ are not, in general, equal, but they are more and more nearly equal as both are smaller; and, by taking each small enough, we may make the *percentage* of difference between them as small as we choose. In other words, their *prime ratio*, just at A, is unity. Again, the inscribed square is less than a circle; the octagon greater than the square, but less than the circle; the regular polygon of 16 sides greater than the octagon, but less than the circle; and so on, constantly doubling the number of sides. But it can be shewn that the difference of area between the polygon and the circle may be made as small a percentage of the area of the circle as we please, by making the sides of the polygon numerous enough. Hence, the *ultimate ratio* of the areas of the circle, and inscribed polygon with an indefinitely great number of equal sides, is unity.

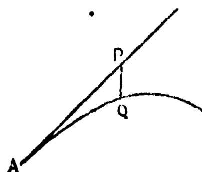
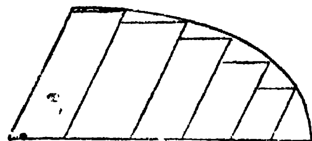


Fig. 1.

The basis of the method, which is implicitly involved in the foregoing illustrations, is Newton's *First Lemma:* 'Quantities, and the ratios of quantities, which tend constantly to equality, and may be made to approximate to each other by less than any assignable difference, become ultimately equal.' In other words, if we can make the *percentage* of difference of two quantities as small as we choose, we must produce ultimate equality.

From this, in his second and third Lemmas, Newton proves the fundamental principle of the integral calculus as applied to the determination of the areas of curves, by shewing that if a set of parallelograms, as in the figure, be inscribed in any curvilinear space, the percentage of difference between the sum of their areas and that of the curve may be made as small as we please by diminishing indefinitely the breadth of each parallelogram, and increasing their number proportionally.


Fig. 2.

Next, he shews how to compare two curvilinear spaces, by supposing them filled with such parallelograms, each of the first bearing to one of the second a constant ratio.

Next, that the homologous sides of similar *curvilinear* figures are proportional.

The sixth Lemma is merely a definition of continuous curvature in a curve, as distinguished from abrupt change of direction.

The seventh, eighth, and ninth Lemmas are of very great importance. The general principle involved in their proof is this—to examine what occurs in indefinitely small arcs, by drawing a magnified representation of them such as always to be on a finite scale, however small the arcs themselves may be. Thus, to shew that the chord of a small arc is ultimately equal to the arc—of which we have in Trigonometry (q. v.) as a particular case, the ultimate equality of an arc and its sine—he

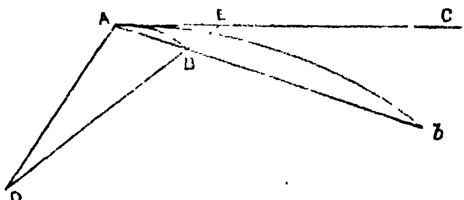


Fig. 3.

proceeds somewhat as follows: Let AB be an arc of continued curvature, AC the tangent at A. Produce the chord AB till it has a *finite* length, A*b*. Describe on A*b*, as chord, an arc similar to AB. This, by a previous lemma, will touch AC at A. Now, as B moves up to A, let the same construction be perpetually made, then *b* will approximate more and more closely to AC (because the arc AB is one of continuous curvature), and the magnified arc will constantly lie between AC and A*b*. Hence, ultimately, when A*b* and AC coincide in direction, the arc A*b* (which is always between them) will coincide with A*b*. Similarly, AD being any line making a *finite* angle with AC, draw DBE cutting off a finite length from AD; this process enables us to prove that the triangles AED, and the rectilinear and curvilinear triangles ABD, are all ultimately equal.

Finally (and this is the step of the greatest importance in the dynamical applications), if the lines AD, DE, D'E' be drawn under the above restrictions, the ultimate ratio of the curvilinear or rectilinear triangles AEB, AE'B' is that of the squares

of corresponding sides. From this, in the ninth and last Lemma, it is easily shewn that the spaces described under the action of a finite force have

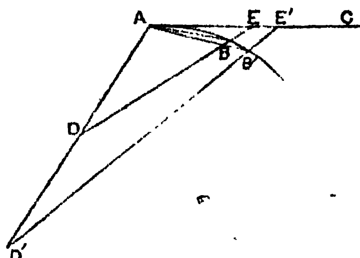


Fig. 4.

their prime ratios as the squares of the times; whence we pass at once to the ever-memorable investigations of the *Principia* regarding the orbits described under the action of various forces.

The method of prime and ultimate ratios is little used now (except in Cambridge, which does honour to itself in making part of the *Principia* a subject of study), as the differential and integral calculus help us to the required results with far greater ease. But to the true student of natural philosophy, the synthetic method of Newton is of very great value, as it shews him clearly at every step the nature of the process he is carrying out, which is too apt to be lost sight of entirely in the semi-mechanical procedures common to all forms of symbolical reasoning.

RA'TISBON. See REGENSBURG.

RA'TLINES, or **RATLINGS**, are steps in the ladders by which sailors ascend from the deck to the mast-heads. They consist of thin cords fastened horizontally across the shrouds at an easy step apart, thus forming a convenient ladder. To prevent the ratline slipping, it is commonly tied to the shroud in a peculiar knot called a clove-hitch.

RAT-SNAKE (*Coryphodon Blumenbachii*), a serpent of the family *Colubridæ* (see COLUBER), which is often kept in a state of domestication in Ceylon, on account of its usefulness in killing rats. Like the rest of its family, it is destitute of poison-fangs. It is capable of being rendered very tame, and displays considerable intelligence.

RAT-TAIL MAGGOT, the larva of a dipterous insect, *Eristalis tenax*, of the family *Muscidæ*. It inhabits mud, and breathes by means of tubes attached in telescope fashion to the tail, which terminates in a brush of hairs, and is always held up to the surface of the water, being elongated when the depth of water increases. The perfect insect is very like a bee.

RATTA'N, RATAN, or **ROTTANG** (*Calamus*), a genus of palms very different in habit from most of the order; having a reed-like, slender, often jointed, and extremely long stem, sometimes even 1000 feet or upwards in length. The name R. is extended to others of the same tribe of palms, having the same general habit, although constituted by botanists into different genera. The stem, which is very smooth, and hard and silicious externally, is either erect, or ascends and descends among trees; often laying hold as it ascends by means of hooked prickles, the extremities of the midribs of its leaves, which are scattered at considerable intervals along its whole length, and envelop it by their sheathing stalks, and then descending in graceful festoons to climb again a neighbouring tree. Sometimes, however, there are no leaves scattered along the stem. Sir James E. Tennent says, in his work on Ceylon: 'I have seen a specimen 250 feet long, and an inch in diameter, without a single irregularity, and no appearance of foliage other than the bunch of feathery leaves at the extremity.' The leaves are always pinnate, and very beautiful. The fruit is a dry berry, covered with imbricated scales, and generally one-seeded.

The species are very numerous, all natives of the East Indies. A few species are found in the southern parts of India; but they abound along the southern foot of the Himalaya, in Chittagong, Silhet, Assam, the south-east of Asia, and many of the islands of that region. They are all very useful, are much employed in their native countries, for making plaited work, ropes, &c., and are very largely imported into Britain and other parts of the world, generally under the name of *Cane*, and chiefly in order to be used for plaited or wicker work. —Bridges of great strength are made, in some parts of the East, of the stems of these palms. They are twisted into ropes in some parts of the East, which are used for binding wild elephants, and for other purposes requiring great strength; the vessels of Java, Sumatra, and neighbouring regions, are very generally furnished with cables made of them, which are extensively manufactured at Malacca; and the Chinese make ropes of rattans by splitting them longitudinally, soaking them, and attaching them to a wheel, which is kept in motion, whilst new rattans are added, one by one, to increase the length of the rope.—The species called *Calamus rudentium*, which has very long stems, is much employed in rope-making. Many species probably furnish the canes of commerce, one of which, *C. verus*, a native of India, is only about 20 feet in length. The elegant walking-canes called



Calamus, or Rattan:
a, part of a stem with leaves; *b*, inflorescence.

Malacca Canes are believed to be the produce of *C. scipionum;* the plant, however, does not grow in Malacca, but in Sumatra.—Small stems of R. are used as a substitute for whalebone in umbrellas.—The fruit of some species of R. is a delicate article of food; and the young shoots, variously dressed, are equal to the finest of vegetables.—A very fine kind of *Dragon's Blood* (q. v.) is obtained from a species of R. (*C. Draco*), and particularly from the fruit, on the surface of which it appears as a

resinous exudation. Various methods are employed for collecting it.

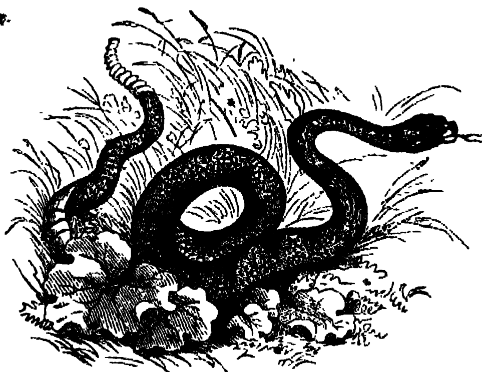
The canes of commerce are usually imported in bundles of 100 canes, each cane from 15 to 20 feet in length; from 200,000 to 300,000 of these bundles are annually imported into Britain.

RATTANY, or RHATANY (*Krameria triandra*), a half-shrubby plant, of the natural order *Polygaleæ*, a native of the cold sterile table-lands of the Andes in Peru and Bolivia. It is called *Ratanhia* in Peru. It is valued for the medicinal properties of the root, which are shared more or less by other species of the same genus, also natives of South America. The dried root is a powerful astringent, and a useful tonic; and is employed in mucous discharges, passive hæmorrhages, and cases of relaxation and debility. It is also used as a tooth-powder, often mixed with orris-root and charcoal. R. root is imported from different parts of South America, but chiefly from Lima. It is extensively imported into Portugal in order to communicate a rich red colour to wines. The peculiar properties of R. root are supposed to be chiefly owing to an acid called *Krameric Acid.*

RATTAZZI, URBANO, an Italian statesman, was born in the middle ranks of life, at Alessandria (Piedmont), in 1810. He was an advocate at Casale, where, in 1847, he was President of the Agricultural Committee. After the proclamation of the constitution in 1848, he was elected member for Alessandria, and began his political career as a democrat. His knowledge, eloquence, and liberal principles raised him to the ministry, and his first act was to write to the bishops, threatening to have them arrested, if they should preach against liberty. He resisted his chief, Gioberti, who wished to send Piedmontese soldiers into Tuscany and Rome, to prevent the occupation of these places by the Austrians and French; urged Charles Albert into a new war with Austria, and after the defeat of Novara, was obliged to retire from the ministry. After Napoleon's *coup d'état*, the liberty of Piedmont was threatened, and Cavour, R., and their parties joined together to defend it. This union was called *connubio*. R. took the portfolio of Minister of Justice in the Cavour Ministry in 1854, and presented the bill for the abolition of convents. The priests were up in arms against him, and he was strenuously opposed by the Catholic party. After the Mazzinian movement in 1857, being accused of weakness in suppressing it, he retired. After the peace of Villafranca, he returned to the ministry. He did not wish to accept definitively the annexation of the Duchies, because he knew that the price of it was Savoy and Nice, which he was unwilling to give up; and being, as is alleged, secretly undermined by Cavour and Sir James Hudson, he fell. He returned to the ministry in 1862, after having made an agreement with Garibaldi to give the assistance and support of the government for an expedition into Turkey. It is alleged that Sir J. Hudson knew it, and in order to dissuade Garibaldi from the enterprise, instigated him to go to Rome. The result was Aspromonte. After that tragedy, R., hated by the parliament and by the country, retired from the ministry. He is an able administrator, an eloquent orator, and much liked by the king.

RATTLESNAKE (*Crotalus*), a genus of serpents of the family *Crotalidæ*, distinguished from the rest of that family by the rattle at the end of the tail. They are also characterised by having only one row of plates under the tail. The genus is subdivided by many authors according to the scales and shields with which the head is covered in different species. All the species are American, and are much dreaded for their deadly venom, although they seldom assail man, unless molested, and the rattle often gives timely warning of danger. The R. is often found at rest in a coiled form, with the rattle somewhat erected from the centre of the coil; and when it begins to be irritated, the rattle shakes. Rattlesnakes are generally rather sluggish in their movements, but they are most active and most dangerous in the warmest weather, their bite being more formidable at such a time, as well as more readily inflicted. The effects of the bite are various, according not only to the condition of the serpent, but also according to the constitution of the person bitten, and the place into which the fangs have been inserted, the worst case being when the poison immediately enters a large vein, and so is carried at once to the most vital parts. Death to human beings has been known to ensue in a few minutes, whilst in other cases, hours or days have elapsed, and sometimes the sufferer recovers. Almost all animals shew what may be deemed an instinctive dread of the R., and a great unwillingness to approach it. Hogs and peccaries, however, are so far from regarding it with dread, that they kill and eat it, finding safety from its venom probably not in any peculiarity of constitution, but in their thickness of skin, and the thickness of the layer of fat under the skin. Rattlesnakes are viviparous, and exhibit attachment to their young. It is said of them, as of the viper, that on the appearance of danger, the mother receives her young ones into her mouth and gullet, or stomach, ejecting them again uninjured when the danger is past, but the same doubt attaches to the story as in the case of the viper. The power of Fascination (q. v.) has not been more frequently ascribed to any kind of serpent.

The rattle is a very peculiar appendage. It consists of a number of thin horny cells, jointed together: each, except the terminal one, of a conical form, and in great part covered by that next to it, against the sides of which its apex strikes when the rattle is shaken, so as to produce a rustling or rattling noise. It is generally believed that the



Rattlesnake (*Crotalus horridus*).

number of joints in the rattle increases with the age of the serpent, one being added at each casting of the skin. One species of R. (*Crotalus horridus*), sometimes called the CASCAVELA, is found in the warm parts both of North and South America. Its muzzle is covered by three or four pairs of plates. Its scales have a sharp elevated keel. It attains the length of eight feet, although it is seldom found of so great a size. Its colour is yellowish-brown

above, with a broad dark streak on each side of the neck, and a series of broad lozenge-shaped spots on the back.—Another species, *Crotalus* or *Uropsophus durissus*, extends further northward, as far as the southern shores of the great lakes. It is of a pale brown colour, with a dark streak across the temples, and dark spots on the body, often assuming the form of bands; the keel of the scales not so strongly developed, and the muzzle with fewer shields than in the former species, which it resembles in size. A third species, *Crotalus* or *Crotalophorus miliaris*, having the head completely covered with large shields, is also common in many parts of North America, and is as much dreaded as either of those already named, notwithstanding its much smaller size, because the sound of its rattle is so feeble as not readily to attract attention. It is of a brownish-olive colour, with brown spots on the back and sides, the belly black.—In the colder countries which they inhabit, rattlesnakes spend the winter in a torpid state, retiring for that purpose into holes, or hiding themselves among moss.

RATZ BOSZORMENY. See Böszormeny.

RAUCH, Christian Daniel, one of the most distinguished German sculptors, was born at Arolsen, the capital of the principality of Waldeck, in 1777. He early began the study of sculpture; but on the death of his father, in 1797, he was obliged to go to Berlin, where he became valet to Frederick-William II., king of Prussia. On the death of that prince, R. determined to follow the bent of his inclination for the fine arts. In this he was assisted by the new king Frederick-William III., who afforded him facilities for designing and modelling statues, and recommended him as a pupil in the Academy of the Fine Arts. A statue of Endymion and a bust of Queen Luise of Prussia executed at this time, convinced the king of R.'s abilities, and he gave him the means of proceeding to Rome for his further improvement. R. spent six years in that city, working at his profession with much assiduity, to render himself worthy of the friendship of Thorwaldsen and Canova. At Rome, he also enjoyed the friendship of William Humboldt, at that time Prussian minister there.

Among his works at this time were bassi-rilievi of 'Hippolytus and Phædra,' a 'Mars and Venus wounded by Diomedes,' a colossal bust of the king of Prussia, and busts of Raphael Mengs and the Count de Wengersky. In 1811, he was called by the king of Prussia to Berlin to execute a monumental statue of Queen Luise. This great work obtained for R. a European reputation. It is placed in the mausoleum of the queen in the garden of Charlottenburg. R. was not, however, quite satisfied with this triumph of his art, but commenced a new statue of the queen, which he finished 11 years afterwards, and which is allowed to be a masterpiece of sculpture. It is placed in the palace of Sans Souci, near Potsdam. R., after this, lived principally at Berlin, but occasionally visited Rome, Carrara, and Munich. He laboured indefatigably in his profession, and by 1824, had executed 70 busts in marble, of which 20 were of colossal size.

R.'s principal works, besides those above mentioned, are—two colossal bronze statues of Field-marshal Blücher, one of which was erected, with great solemnity, at Breslau in 1827; a bronze statue of Maximilian of Bavaria, erected at Munich in 1835; and statues of Albert Dürer, Goethe, Schiller, and Schleiermacher, erected in various places in Germany. His greatest work is the magnificent monument of Frederick the Great, which adorns Berlin. The model for this statue was designed by R. in conjunction with Professor Schinkel, the architect, in 1830; and after 20 years' labour, the statue was finished in 1850, and was inaugurated with great pomp in May 1851.

In his works, R. has the merit of having surmounted the difficulties which modern costume opposes to the ideal representation of personages of the present age; and while he preserved the salient points of his model, he possessed the art of sacrificing the less important details to the exigences of the beautiful. He died at Dresden on December 3, 1857.

RAU'HÉS HAUS is the name of a great institution founded and hitherto managed by Wichern at Horn, near Hamburg, in connection with the German Home Mission (*Innere Mission*). It is partly a refuge for morally neglected children; partly a boarding-school for the moral and intellectual education of children of the higher classes; lastly, a training-school for those who wish to become teachers or officials in houses of correction, hospitals, &c., in promotion of the objects of the Home Mission. The first foundation of this model institution—for such it has become for Germany as well as for France—was laid by a wealthy citizen of Hamburg, who made over to it a piece of land. It was opened on November 1, 1831, by Wichern with 12 morally neglected children. By the addition of new houses, the whole has, however, been very much enlarged, and has of late almost grown into a colony. A printing-office, a bookbinder's shop, and bookselling form part of the institution. Recently, about 100 neglected children (one-third are girls) receive their education in the establishment. They live in families of twelve, each family being under the paternal superintendence of a young artisan, who employs the children according to their capabilities, partly in indoor, partly in outdoor, manual labour. The watching and care of these children devolve on assistants, who also take part in the instruction of the institution, with a view to prepare themselves for the work of the Home Mission in other institutions. These instructors receive board and clothing, but no salary. In connection with the R. H., there was founded in 1845 a kind of conventual institute for the education of young men, with a view to become heads or superintendents of similar institutions. Entrance into this institution is limited to the age of 20—30. Besides religious belief and good character, freedom from military duties, bodily and mental health, some scholastic acquirements, and a knowledge of some craft or of agriculture, are required. The boarding-school was established in 1851, and at the same time a seminary was founded, in which 12 brethren of the R. H. are especially prepared for school-work.

RAUMER, Fried. Ludw. Georg von, a noted German historical writer, was born on May 14, 1781, in Wörlitz, near Dessau; studied law and political economy at Halle and Göttingen; filled different law appointments (1806—1811); and in the last-mentioned year was named Professor at Breslau. In 1819, he was called to Berlin as Professor of History and Political Economy. Among his writings may be mentioned—*Sechs Dialoge über Krieg und Handel* (1806); *Das Brittische Besteuerungssystem* (Berl. 1810); *The Orations of Æschines and Demosthenes de Corona* (Berl. 1811); *CCI Emendationes ad Tabulas Genealogicas Arabum et Turcarum* (Heidelb. 1811); *Handbuch merkwürdiger Stellen aus den lat. Geschichtschreibern des Mittelalters* (Handbook of Remarkable Passages in the Latin Historians of the Middle Ages, Bresl. 1813); *Vorlesungen über die alte Geschichte* (Lectures on Ancient History,

2 vols. Leip. 1847); *Geschichte der Hohenstaufen und ihrer Zeit* (History of the Hohenstaufen dynasty and their Time, 6 vols. Leip. 1823—1825); *Ueber die geschichtliche Entwickelung der Begriffe von Recht Staat und Politik* (On the Historical Development of the Ideas of Law, State, and Politics, 2d ed. Leip. 1832); *Prussian Municipal Law* (Leip. 1828); *Briefe aus Paris und Frankreich* 1830 (2 vols. Leip. 1831); *Briefe aus Paris zur Erläuterung des Geschichte des 16th und 17th Jahrh.* (2 vols. Leip. 1831); *Geschichte Europas seit dem Ende des 15 Jahrh.* (History of Europe from the End of the 15th Century, vols. 1—8, Leip. 1832—1850); *England*, 1835 (2 vols. Leip. 1836); *England*, 1841 (3 vols. Leip. 1842); *Beitrage zur Neuern Geschichte aus dem Brit. Museum, &c.* (5 vols. Leip. 1836—1839); *Italie: Beiträge zur Kenntnissdies es Landes* (2 vols. Leip. 1840); *Die Vereinigten Staaten Von Nordamerika* (2 vols. Leip. 1845); *Antiquarische Briefe* (Leip. 1851). The unfavourable reception of an oration of R. in honour of King Frederick II. compelled him, in 1847, to resign the secretaryship and membership of the Academy of Sciences at Berlin, in consequence of which he was elected town-councillor of Berlin, and member of the Frankfurt Parliament, where he belonged to the right centre. From Frankfurt, he went as ambassador to Paris. Subsequently, he became a member of the first chamber at Berlin. In 1853, he was nominated, at his own request, Professor Emeritus at the university of Berlin.

RAUMER, Karl Georg von, brother of the preceding, was born April 9, 1783, in Wörlitz, studied from 1801—1805 at Göttingen and Halle, then at the Mining Academy at Freiberg, and was appointed Professor of Mineralogy at Breslau University in 1811. He took part as a volunteer in the War of Liberation (1813—1814), was translated in 1819 to the university of Halle; and finally, in 1827, was appointed Professor of Mineralogy and Natural History in the university of Erlangen. R. has obtained a wide and well-deserved reputation by his geographical and geological writings, among which are *Geognostische Fragmente* (Geognostic Fragments, Nürnb. 1811); *Der Granit des Riesengebirges* (The Granite of the Riesengebirge, Berl. 1813); *Das Gebirge Niederschlesiens* (The Mountains of Lower Silesia, Berl. 1819); *A B C Buch der Krystallkunde* (The A B C of Crystallography, 2 vols. Berl. 1817; supplem. 1821). His interest in literary and scholastic education is evinced in his valuable *Geschichte der Pädagogik* (History of Pedagogy, 4 vols. Stuttg. 1846—1855). Other works of more or less consequence are his *Lehrbuch der allgemeinen Geographie* (Manual of Universal Geography, Leip. 1848); *Palestine* (Leip. 1850); *Der Zug der Israeliten aus Aegypten nach Canaan* (Leip. 1837); and *Kreuzzüge* (Stuttg. 1840).

RAUPACH, Ernst Benj. Sal., a German dramatist, born on May 21, 1784, in Straubitz (Silesia), received his education in the Gymnasium at Liegnitz, studied theology at Halle, was for ten years tutor in Russia, held lectures at St Petersburg University, and was subsequently (1816) appointed there Professor of Philosophy, German Literature and History. R. left Russia in 1822, and died at Berlin, March 18, 1852. Among his early plays, the following are noteworthy—*The Princes Chawansky* (1818); *Die Gefesselten* (The Enchained, 1821); *Der Liebe Zauberkreis* (The Magic Ring of Love, 1824); *Die Freunde* (The Friends, 1825); *Isidor und Olga* (1826); *Rafaele* (1828); *Die Tochter der Luft* (The Daughter of the Air), after Calderon (1829). Among his comedies may be mentioned—*Critic und Anticritic*; *Die Schleichhändler* (The Smugglers); *Der Zeitgeist* (The Spirit of the Time); *Das Sonnett*; and the farces, *Denk an Cäsar* (Remember Cæsar), and *Schelle im Monde*. Of his posthumous works, the principal are—*Jacobine von Holland* (1852); *Der Kegelspieler* (The Player at Nine-pins); the tragi-comedy, *Mulier taceat in Ecclesia* (1853); and *Seed and Fruit* (1854). R.'s writings display great knowledge of stage-effect, a happy talent for the invention of new and interesting situations, a power of vivid dramatic diction, and a fine play of verbal wit.

RAVAILLAC, François, a native of the French province of Angoulême, where he was born in 1578, has acquired an obnoxious reputation as the murderer of Henri IV. of France. In early life, R. was in turn clerk to a notary and master of a school; but having fallen into debt, he was thrown into prison, the confinement and restraint of which preyed upon his health, and produced hallucinations of mind. Under the influence of this mental excitement, he renounced all secular pursuits; and on his release from prison, after having served for a time in the order of the Feuillants, he fell under the influence of the Jesuits, through whose instrumentality it is believed that his insane hatred of the Huguenots, as the enemies of the church, was directed more especially against Henri of Navarre, their former leader. Having resolved to assassinate the king, he eagerly watched his opportunity, and on the 14th of May 1610, as the king was passing in his coach through the narrow street of Laferronnerie, got upon the right hinder-wheel of the carriage at the moment that its further advance was hindered by a heavy wagon in front of it, and leaning forward, he plunged a knife into the breast of the king. The first blow glanced aside, but at the second thrust, the knife entered the heart. R. escaped in the confusion, but being soon captured with the knife still in his hand, he admitted his guilt; and having been formally tried and condemned, he was put to the torture; and suffered death on May 27, in the Place de Grève, under circumstances of great cruelty, his body being torn asunder by horses. R. refused to the last to acknowledge whether he had had instigators or abettors, and hence the widest scope was given to conjecture, suspicion being in turn directed to the queen, Marie de' Medici, and her favourites, the Concini, to the Duc d'Epernon, and to the Spanish court and their Jesuit advisers, but there is no good ground for such suspicions. M. Henri Martin (*Histoire de France*) and M. Poirson (*Histoire de Henri IV., tome II.*) have examined the particulars of the process instituted against R. with scrupulous impartiality, and have come to the conclusion that the real cause of the crime was fanaticism degenerated into monomania.

RÂVAN'A (from the causal of the Sanscrit *ru*, cry, alarm, hence literally he who causes alarm) is the name of the *Râkshasa* (q. v.) who, at the time of Râma, ruled over Lankâ or Ceylon, and having carried off Sitâ, the wife of Râma, to his residence, was ultimately conquered and slain by the latter. Râvan'a is described as having been a giant with ten faces, and in consequence of austerities and devotion, as having obtained from S'iva a promise which bestowed upon him illimited power, even over the gods. As the promise of S'iva could not be revoked, Vishn'u evaded its efficacy in becoming incarnate as Râma, and hence killed the demon-giant. See under Vishn'u and Râkshasa.

RA'VELIN, in Fortification, is a triangular work of less elevation than the main defences, situated with its salient angle to the front before the curtain,

which with the shoulders of the adjoining bastions, it serves to protect. It is open at the rear, so as to be commanded by the curtain, if taken, and is separated from that work by the main ditch, while in its own front the ditch of the ravelin intervenes between itself and the covert-way. The guns of the ravelin sweep the glacis, and perform a very important function in commanding the space immediately before the salient angles of the two next bastions, ground which the guns of the bastions themselves cannot cover. The bastions, on the other hand, flank the ravelin. In the fortifications of Alessandria, designed by Bousmard in 1803, the ravelins are placed in front of the glacis. See the diagrams in art. FORTIFICATION.

The original name of the ravelin was *rivellino*, which indicates a derivation from *vegliare*, to watch, the ravelin having probably been at first a watch-tower, answering to the still earlier barbacan.

RAVEN (*Corvus corax*), a species of Crow (q. v.), remarkable for its large size. It is more than two feet in length from the tip of the bill to the extremity of the tail. The bill is thick and strong, compressed at the sides, the mandibles sharp at the edges; the upper mandible curved at the tip, and exceeding the lower in length. The base of the bill is surrounded with feathers and bristles. The tail is rounded, but the middle feathers are considerably the longest. The wings are long—extending from tip to tip to 52 inches—the fourth quill-feather being longest. The colour is a uniform black, with more or less of metallic lustre, which is particularly conspicuous in the elongated throat-feathers of the male, and is wanting in the whole plumage of the female and young.



Raven (*Corvus corax*).

The R. is a bird of wide geographic distribution. It is found in almost all parts of the northern hemisphere, but most abundantly in the more northern and the mountainous parts of it. In other parts of the world, and within the northern hemisphere itself, however, other closely allied species have probably been often mistaken for it. There are several species of crow very similar to the R. in colour, size, and habits.

The R. is generally to be seen either solitary or in pairs. It is one of the most thoroughly omnivorous of birds. It feeds on fruits and nuts in forests; it picks up worms or molluscs; it sucks eggs; it kills young hares, or even lambs; it rejoices in carrion, and not unfrequently attacks weak or sickly beasts, almost invariably choosing their eyes as its first point of assault. It generally makes its nest of sticks, coarse weeds, wool, hair, &c., in rocky places, on a narrow ledge of a precipice, or in some similar situation. Ravens are occasionally captured when young, and become interesting pets, being remarkable for their impudence and cunning, their look of sage thoughtfulness, their inquisitiveness, their mischievous propensities, which prompt them to destroy everything that can be destroyed, and always as if the fact of its destruction afforded them pleasure, their thievishness, their love of glittering things, and their power of imitating human speech, which is almost equal to that of parrots. The R. is celebrated for its longevity, and instances are on record of ravens which have certainly lived for seventy or eighty years. The R. has been generally reckoned a bird of ill-omen, probably on account both of its colour and its extremely harsh croaking voice, which may sometimes be heard in fine weather as it coming from the sky, the R. being a bird of powerful wing, and often soaring very high in the air.

RAVE'NNA, an important city of Central Italy, 43 miles east-south-east from Bologna, and 4½ miles from the Adriatic; lat. 44° 24′ N., long. 12° 12′ E. Pop. (1862) of the commune, 57,303; of the town proper, 19,118. It is situated in the midst of a well-watered, fertile, and finely-wooded plain. R. is surrounded by old bastions, and by walls where may still be seen the iron rings to which the cables of ships were formerly fastened; the sea is now at the distance of about 4 miles from the city. The streets are wide; the squares are adorned with statues of the popes, and the houses have a gloomy appearance. R. is an ancient city, rich in monuments of art. The cathedral was built in the 4th c.; it has five naves, supported by 24 marble pillars, and in the sacristy there are preserved the ivory chair of St Massimino and the Calendario Pasquale, both of the 4th century. San Francesco possesses the tomb of Dante, erected in the 15th century. The library of R. contains 50,000 volumes. It has an archæological museum, and many educational institutions. There are manufactures of silk, linen, paper, glass, and kitchen utensils.

R. was probably of Umbrian origin; it was at least an Umbrian city when it passed into the hands of the Romans. Augustus made it a first-class seaport and naval station; 400 years later, the Emperor Honorius took refuge there, and made R. the capital of the empire. The city was taken by Odoacer, then by Theodoric and by Totila; the latter was conquered by Narses, who made it the residence of the exarchs in 553. In 1218, it became a republic. In 1275, Guido da Polenta conquered it, and there established his court, where he received Dante. R. was afterwards taken by the Venetians, who kept it till 1509. Under Charles V., it passed into the hands of the popes.

Under the walls of R., a great battle was fought in 1512 between the French and the Spaniards, in which Gaston de Foix purchased victory with his life.

RAVENSCROFT, THOMAS, an eminent English musical composer. He was born in 1592, received his musical education in St Paul's choir, and had the degree of Bachelor of Music conferred on him when only 15 years of age. In 1611, appeared his *Melismata, Musical Phansies, &c.*, a collection of 23 part-songs, some of them of great beauty; and three years later, he brought out another collection of part-songs under the title of *Brief Discourses*, with an essay on the old musical modes. Turning his attention to psalmody, he published, in 1621, a

collection of psalm-tunes for four voices, entitled *The Whole Booke of Psalms, composed into Four Parts by Sundry Authors to such Tunes as have been and are usually sung in England, Scotland, Wales, Germany, Italy, France, and the Netherlands.* This was the first publication of its kind, and all similar works of later date have been largely indebted to it. Among the contributors to this collection were Tallis, Morley, Dowland, and all the great masters of the day; the name of John Milton, the father of the poet, appears as the composer of York and Norwich tunes; while St Davids, Canterbury, Bangor, and many others which have since become popular, are by R. himself. Each of the 150 Psalms has a distinct melody assigned it. Two collections of secular songs similar to the *Melismata*, and entitled *Pammelia* and *Deuteromelia*, have been assigned to R.; but it is probable that only a few of these songs were composed by him, while he may have revised and edited the whole. A selection from the *Melismata, Brief Discourses, Pammelia*, and *Deuteromelia* was printed by the Roxburghe Club in 1823. R. died about 1640.

RAVIGNAN, GUSTAVUS FRANCIS XAVIER DELACROIX DE, a celebrated preacher of the Jesuit order, was born at Bayonne, December 2, 1795. He studied in the Lycée Bonaparte at Paris, and having embraced the legal profession, and obtained his degree, was named auditor of the Cour Royale at Paris, and afterwards, in 1821, received an appointment in the Tribunal of the Seine. The prospect thus opened for him, however, soon lost its attraction, and in 1822 he formed the resolution of relinquishing his career at the bar, and entering the church. Having spent some time in the college of St Sulpice, he soon passed into the novitiate of the Jesuits at Montrouge, and thence to Dole and St Acheul for his theological studies, at the termination of which he was himself appointed a professor. On the expulsion of the Jesuits from France in 1830, R. withdrew to Freiburg in Switzerland, where he continued to teach in the schools of his own order; but after some time he was transferred to the more congenial duty of preaching, first in several of the Swiss towns, and afterwards in Savoy, at Chambery, at St Maurice, and other places. At length, in 1835, he appeared in the pulpit of the cathedral of Amiens. In the following year, he was chosen to preach the Lenten sermons at the church of St Thomas d'Aquin in Paris; and finally, in 1837, was selected to replace Lacordaire (q. v.) at Notre Dame, in the duty of conducting the special 'conferences' for men which had been opened in that church. For ten years, Père de R. occupied this pulpit with a success which has rarely been equalled, and his 'conferences' are regarded as models of ecclesiastical eloquence. In 1842, he undertook in addition to preach each evening during the entire Lent; and it is to the excessive fatigue thus induced that the premature break-down of his strength is ascribed. To the labours of the pulpit, he added those also of the press. He published an Apology of his order in 1844; and in 1854 a more lengthened work with the same view, *Clement XIII. et Clement XIV.*, 2 vols. 8vo, which was intended as a reply to the *Life of Clement XIV.*, by the Oratorian Father Theiner. These, with some occasional sermons and 'conferences,' constitute the sum of the publications issued during his life. In 1855, he was invited by the Emperor Napoleon III. to preach the Lent at the Tuileries. On the 26th February 1858 he died in the convent of his order at Paris, in his 63d year. His Memoirs have been published by his brethren, and a collected edition of his works and remains has been for some time in progress.

RAVINA'LA. See TRAVELLER'S TREE.

RAWAL PINDI, a large, walled town of the Punjab, in the doab between the rivers Indus and Jhelum. It contains a large bazaar, and carries on an active transit-trade between Hindustan and Afghanistan, but is not otherwise noteworthy. Pop. about 16,000.

RA'WICZ, a town of Prussia, in the government of Posen, close to the Silesian frontier, 64 miles south of Posen by railway. It is surrounded by walls. Spinning, weaving, brewing, manufactures of tobacco and leather, and a considerable trade, are carried on. Pop. (1862) 9756.

RAWLINSON, SIR HENRY, K.C.B, oriental scholar and diplomatist, was born at Chadlington, Oxfordshire, in 1810, and educated at Ealing, Middlesex. He entered the East India military service in 1826, and served in the Bombay presidency until 1833, when he was appointed to assist in reorganising the army of the Shah of Persia. He had early devoted himself to eastern languages and antiquarian researches, and when stationed at Kermanshah, in 1835, he began to study the cuneiform (q. v.) inscriptions of Persia. He announced his cuneiform discoveries in 1837—1838 to the Royal Asiatic Society of London, and published his travels in Susiana in the *Geographical Society's Journal.* In 1840, he obtained the Geographical Society's gold medal for his paper on Ecbatana. He also made a translation of the Behistun inscription. In 1840, he travelled through Sinde to Candahar, where he remained as political agent throughout the Afghan war, until the evacuation of the country in 1842. During this period, he assisted at General Nott's actions with the Afghans, and accompanied the Candahar column in the advance to Ghizni and Cabul. See AFGHANISTAN. He was made C.B. for these services. Being transferred to Bagdad as political agent in Turkish Arabia in 1843, he remained there (with the exception of a visit to England in 1850 and 1851, when he returned with the rank of Consul-general) until 1855. Incited by the archæological and historical researches of Botta and Layard, he diligently occupied himself with the study of the Median, Persian, Assyrian, and Babylonian cuneiform inscriptions, the results of which have been partly incorporated in the translation of Herodotus published by his brother, Rev. G. Rawlinson of Oxford, partly given to the world by R. himself in the *Asiatic Society's Journal.* He retired from the East India Company's service with the rank of lieutenant-colonel, was nominated a Crown Director of the Company in 1856, and in January 1858 was elected M.P. for Reigate, but vacated his seat in September, on being appointed a member of the Council of India. In 1859, he proceeded to Teheran as envoy-extraordinary and minister-plenipotentiary to the court of the Shah. He was admitted as corresponding member of the Institute of France in 1837, and in 1852 was made Chevalier of the Order of Merit by the king of Prussia.—RAWLINSON, REV. GEORGE, brother of the preceding, graduated at Oxford, and was elected a fellow and tutor of Exeter College. Appointed Bampton lecturer in 1859, he published his lectures in the following year under the title of *Historic Evidence for the Truth of Christian Records.* Other works of R.'s are *Christianity and Heathenism* (1861); the edition of Herodotus before mentioned; and *The Five Great Monarchies of the Ancient World—Chaldæa, Assyria, Babylonia, Media, and Persia.*

RAY (*Raia*), a Linnæan genus of cartilaginous fishes, belonging to the order *Plagiostomi* (q. v.) of Müller, and now divided into a number of genera, which form the family *Raiidæ* of many naturalists,

and the suborder *Raiæ* of some. The true rays have a flat body; the pectoral fins are large and fleshy, appearing as lateral expansions of the body, and along with it forming a circular disc or a rhomboid, to which is attached a rather long and slender tail. The pectoral fins are prolonged till they meet in front of the snout, and backwards till they join the ventral fins. The eyes look upwards, and the spout-holes or spiracles are also directed upwards. The gill-openings, which are five in number, are on the under side of the body, where also the mouth is situated. The gills are close behind the mouth; and towards the tail are the stomach, intestines, and other viscera, in a circular cavity. The males are furnished with claspers. The eggs are large, resembling those of sharks, but more rectangular in form; thin horny cases, with projections at each of the four corners, having such a resemblance to a hand-barrow, that on some parts of the English coast they receive the name *Skate-barrows.* They are also familiarly known as *purses*, and are very often to be seen cast up by the waves upon the beach. Rays live mostly near the bottom of the sea, and where the bottom is sand or mud. When disturbed, they glide in an undulating manner, and defend themselves against assailants by lashing with the tail, which is generally armed with spines, and in some species—called *Sting Rays* (q. v.), the family *Trygonidæ* of some naturalists—carries a single long and strong spine, notched on both sides, a formidable weapon, which is used somewhat as a saw. Rays are very voracious; they devour fishes, molluscs, and crustaceans. Many of the rays are popularly called SKATE. All of them are edible; some, however, are much better than others; and whilst, on some parts of the British coast, they are regularly used for food, and brought to market, on other parts of the coast, they are rejected, and are thrown out to rot on the beach. Of British species, two of the most common are the Thornback (q. v.) and the Homelyn (q. v.). Another is the Common Skate, also called the Blue Skate or Gray Skate (*Raia batis*), which is better than either the Thornback or Homelyn as an article of food. The Long-nosed Skate (*R. mucronata*) and the White Skate (*R. oxyrhynchus*) are also common. The skates sometimes attain a very large size, more than eight feet in breadth.—*Torpedo* (q. v.) *Cephaloptera* (q. v.), &c., are genera of rays.

RAY (or, as he himself occasionally spelt it, **WRAY**), JOHN, an eminent naturalist, was born at Black-Notley, near Braintree, in Essex, 29th November 1627. He went to Cambridge University, where, after having finished his course, he was elected a Fellow, and appointed Greek lecturer, and afterwards mathematical tutor in Trinity College; but after a time began to devote himself entirely to the study of natural history. Accompanied by a kindred spirit, Francis Willughby, a friend and former pupil of his own, R. travelled over most of the United Kingdom, collecting and investigating botanical and zoological specimens; and in 1663, they started on a tour through the Low Countries, Germany, Italy, and France, with a similar object, Willughby taking the zoology under his charge, leaving R. the botany. In 1667, R. was elected a Fellow of the Royal Society, to whose *Transactions* he occasionally contributed valuable papers. In 1672, his friend Willughby, with whom R. had lived ever since he had left the university, died, leaving him guardian to his two sons (the younger of whom was afterwards raised to the peerage as Baron Middleton), an office which R. discharged, and then, after several changes of residence, settled down in his native village, where he died, January 17, 1705. As a botanist and zoologist, R. ranks very high, being distinguished for his patience, acuteness, and sagacity; and in knowledge he seems to have been far in advance of his time, as the new method of classification of plants which he proposed, though little appreciated or adopted by his contemporaries and immediate successors, was eagerly laid hold of by Jussieu and others, under whose hands it became the foundation of what is now known as the 'Natural System' of classification. R.'s zoological works are considered by Cuvier as the foundation of modern zoology. In zoology, as in botany, R.'s works are remarkable for the precision and clearness of the classification which he adopts, his divisions in the former subject being founded on the structure of the heart and the organs of respiration. The chief of his works on botany are *Methodus Plantarum Nova* (1682, 2d edition, revised and amended by himself), in which he details the principles of his new method of classification of plants; *Catalogus Plantarum Angliæ* (1670), the basis of all the subsequent floras of this country; and a second (1677), third (1690), and fourth (1696) edition of which were published by himself; *Historia Plantarum* (3 vols. 1686—1704), a compilation, including descriptions of all the species which were then known. His zoological works include the *Synopsis Methodica Animalium, Quadrupedum et Serpentini Generis* (1693), and three posthumous volumes on Birds, Fishes, and Insects, published by Dr Derham. He was also the author of some theological works. His friend Willughby having collected the materials for an extensive work on the animal kingdom, left to R. the task of arranging and classifying them, and the work accordingly appeared in 3 vols., the *Ornithologia* in 1676, with an English translation by R. in the following year, and the *Historia Piscium* in 1686 (2 vols.). In these volumes were described a large number of species of birds and fishes, which had escaped the observation of previous naturalists.

RAYNOUARD, FRANÇOIS JUSTE MARIE, a French poet and philologist, was born at Brignoles, in Provence, September 8, 1761. He studied at Aix, and came to Paris to cultivate literature at the age of 23, but soon went back to the south, and joined the bar at Draguignan, where he acquired a high reputation. In 1791, he was elected a member of the Legislative Assembly; but after the fall of the Girondins, whose opinions he shared, he was thrown into prison, and fortunately forgotten. Released from confinement after the fall of Robespierre, he resumed his profession of advocate, and in the course of five or ten years, acquired a modest competency. He then returned to Paris, and devoted himself anew to literary pursuits. His first poem, *Socrate au Temple d'Aglaure* (Par. 1803), was followed by the tragedies, *Eléonore de Bavière* and *Les Templiers*, the latter of which was brought on the stage in 1805, and met with unbounded success. Two years later, R. was chosen a member of the Academy, of which he became perpetual secretary in 1817. He had been made a member of the imperial legislative body in 1806, and Napoleon, it is said, even meditated appointing him to the presidency, but could not get over R.'s brusque manner and fearless independence of spirit. The principal dramas which he wrote during the *régime* of Napoleon, besides those already mentioned, are *Scipio*, *Les Etats de Blois*, *Don Carlos*, *Charles I.*, *Debora*, *Jeanne d'Arc à Orleans*. Towards the fall of the Empire, his attention was turned to linguistic studies, particularly to the study of the Provençal language and literature; and his researches into the origin, grammatical rules, and transformations of the Romance tongue, led to many valuable discoveries, though his theories as to the relation of the

language of the troubadours to the other tongues derived from Latin, have been shewn to be erroneous (see ROMANIC LANGUAGES). His chief writings in this department are—*Eléments de la Grammaire Romane* (Par. 1816); *Choix de Poésies Originales des Troubadours* (Par. 6 vols. 1816—1821); *Grammaire comparée des Langues de l'Europe Latine dans leur Rapports avec la Langue des Troubadours* (Par. 1821); *Observations Philologiques sur le Roman du Rou* (Rouen, 1829); *Influence de la Langue Romane* (Par. 1835); and *Lexique Roman, ou Dictionnaire de la Langue des Troubadours* (Paris, 6 vols., 1838—1844). R. died at Passy, near Paris, October 27, 1836.

RAZOR, the sharp-bladed instrument used for shaving the beard, has been in use from very ancient times; it is alluded to by Homer, and shaving was in fashionable use by the Greeks and Romans (see BEARD), as a mark of civilisation. Razors are almost universally metal blades, made exceedingly sharp; but an exception to this is found in some of the razors used by savage nations, as, for instance, the Tahitians, who use pieces of shells and sharks' teeth, upon which they grind very fine edges, sufficiently sharp to remove the beard. The Chinese and Japanese, who shave the head as well as the chin, use razors similar to the European, except that they rarely have handles. The steel of which they are made is of a remarkably fine quality.

The manufacture of razors, in this country, is chiefly carried on in Sheffield, which place also supplies a large export trade. Great care is exercised in choosing the steel for making the blade, but notwithstanding this, there is scarcely an article made by cutlers which is so uncertain in quality when used. Nearly 20 operations are required to produce a razor; nevertheless, such is the perfection to which manufactures are brought by a division of labour, and the application of machinery, that the razors supplied to the army (at the contract-price of 4½*d.* each) cannot be surpassed for quality.

RAZOR-BILL, or **RAZOR-BILLED AUK** (*Alca torda*), a species of Auk (q. v.), also called the Black-billed Auk, very common on the coasts of Britain, and of all the northern parts of the Atlantic Ocean, frequenting lofty precipices, from which its



Razor-Bill (*Alca torda*).

eggs are taken, with those of guillemots, &c., by persons who are let down by ropes for that purpose. The eggs are esteemed a delicacy; and the flesh of the bird itself is much used for food. Great numbers of razor-bills are annually killed for the sake of their feathers, particularly on the coast of Labrador, where they are extremely abundant. The R. is about 17 inches long, from the extremity of the bill to that of the tail. It is a very fierce bird, and if seized, will lay hold of the hand in return, and submit to be choked ere it will let go. The egg is about three inches long. The bird lays one or two, upon ledges of rock or in fissures.

RAZOR-FISH, or **RAZOR-SHELL**. See SOLEN.

RAZOR-STROP, an article used for the purpose of sharpening razors. It usually consists of a piece of wood, an inch and a half broad, and 10 or 12 inches long, upon each side of which is glued a piece of leather; one of the pieces of leather is usually dressed with a composition of carbonate of iron and grease, which is used first, and the sharpening is finished on the undressed leather of the other side. A leathern strop is frequently used without fixing on wood. In the West Indies, razor-strops are commonly made of pieces of the wood of *Yucca gloriosa*, *Eriodendron anfractuosum*, *Agava vivipara*, *Ochroma lagopus*, and *Anona palustris*, all of which contain minute deposits of silica in their cellular structure, which render them very efficient for the purpose. Species of *Boletus* are so used in Britain.

RÉ, ILE DE (*Rex insula*), is a small island on the coast of the French department of Charente Inférieure, opposite the city of La Rochelle, from which it is separated by the Pertuis Breton. It is about 18 miles long, and 4 miles broad. It contains 8000 inhabitants, most of whom are engaged in fishing. The island is skirted by high cliffs, and strongly fortified by four forts. It has several good harbours and two light-houses; but there are neither springs nor wood on the island, and next to fishing, the culture of the vine constitutes the chief occupation of the islanders. Brandy made from the wines of Ré, and sea-salt, are the principal articles of the trade of the island. St Martin, which ranks as the capital of Ré, is a well fortified little town with a good harbour, and is the chief seat of the trade. Oyster-farming has of late become an important branch of industry. See OYSTER.

REA'CTION, a term used in reference to the political history of a nation, to designate that tendency, often shewing itself, to recoil from the effects of reform or revolution, and to seek a restoration of the previous state of things, or even of one still more antiquated and despotic. The causes that lead to reaction are various. Sometimes it springs, partly at least, from mere disappointment at the smallness of the *visible* results of those changes advocated with so much eloquence, and waited for with so much enthusiasm and hope. The inconsiderate imagination of the people expects a millennium to follow every important change; and when, after the event, men find they are still in the old world of imperfections, hardships, and sorrows, they are prone to believe that they have been deluded, and are only too willing to lend an ear to the insidious misrepresentations of those who are opposed to all progress. But more frequently political reaction springs from immature, or injudicious, or extravagant revolution. The times are not yet ripe (as in the first Italian revolts), or the leaders are unfit (as in the German and Hungarian struggles of 1848—1849), or excesses are committed (as in the great French outbreak of 1789), and so a revolution is nipped in the bud, or overthrown on the battle-field; or, inflamed with sanguinary thirst of revenge, it goes mad in a 'reign of terror,' and exhausting itself in unprofitable frenzies, falls at last an easy prey to any bold and unscrupulous adventurer whom the crowd may elect out of desperation and disgust of anarchy, and whose rule is as absolute as any that preceded it. A reaction may thus, in certain cases, be useful, in so far as

it teaches reformers and revolutionists the point beyond which nature forbids them to go; but its agents are almost invariably base in character, odious in their principles, and selfish in their projects. Religious reactions exhibit the same characteristics as political ones, and proceed from the same causes.

REACTION is the term employed in Medicine and Surgery to indicate the process of recovery from a state of collapse. The subjects Collapse, Reaction, and the general effects of Shock upon the system, are considered in the article on SHOCK.

READE, CHARLES, D.C.L., one of the more distinguished novelists of the day, was born in 1814. He is the youngest son of the late John Reade, Esq., of Ipsden House, Oxfordshire. He received his college education at Oxford, and so distinguished himself as to secure a Fellowship. In 1843, he was called to the bar as a member of Lincoln's Inn; but his legal studies may be presumed to have been merely nominal, and in no long time it became obvious that his chosen career was that of literature. The books by which he first became known as a writer of distinct mark and promise were his *Peg Woffington* and *Christie Johnstone*, both full of talent, though as yet somewhat crude and immature. In 1856, he fairly established his reputation in the novel in 3 vols., *Never too Late to Mend*, by which he is still best known to the general public. Among his subsequent works are a tale in one volume, *The Course of True Love*, remarkable for a rare nicety and subtlety in the delineation of its leading female character; *White Lies* (3 vols. 1858); and *The Cloister and the Hearth*, an elaborate resuscitation of the life of the middle ages, the first sketch of which had appeared as a serial in the pages of *Once a Week*. He is besides the author of several dramas, which have had more or less success on the stage; the most general favourite, perhaps, being that entitled *Masks and Faces*. Mr R. is by common consent a writer of marked ability. He has much of the true talent of the *raconteur*, along with considerable dramatic instinct, and from all his later novels, a sense of general intellectual vigour is strongly borne in upon the reader; while a certain wayward crotchetiness and odd aggressive eccentricity from time to time cropping out, serve rather to give to his writings some relish and sting of individuality, than seriously to mar its effect.

REA'DING, a flourishing municipal and parliamentary borough of England, capital of Berkshire, stands on the left bank of the Kennet, 1½ mile above the junction of that river with the Thames, and 36 miles west of London by the Great Western Railway. It is irregular in plan, though recently it has been improved in this respect. The tongue of land immediately above the confluence of the rivers, is the chief business part of the town. The church of St Lawrence, with a tall flint tower, still shews traces of its original Norman character; and the Benedictine Abbey, now a mere shell, was founded in 1121, and was at one time the third in size and wealth in the country. Of the numerous educational establishments, the free grammar-school, to which are attached two fellowships at St John's College, Oxford, and two scholarships, has an endowment of £50 per annum. R. is an important mart for corn and other agricultural produce, carries on manufactures of silks, silk-ribbons, &c., and has extensive iron-works and a large biscuit factory. Pop. (1861) 25,045.

READING, a city of Pennsylvania, U.S., on the left bank of the Schuylkill River, 58 miles northwest from Philadelphia, pleasantly situated on an ascending plain, and supplied by a mountain behind it with streams of pure water. It has regular streets, court-house and public offices, several newspapers, 3 blast-furnaces, 2 rolling-mills, 4 foundries, factories of cotton, woollen, nails, &c., and flour and saw-mills, with a large trade in coal by canal and railway. Pop. in 1860, 23,162.

READING AND SPEAKING. Reading is the delivery of language from writing; speaking is the utterance of spontaneous composition. Reading is merely mechanical when words are intelligibly but unimpressively delivered; and it is oratorial in effect when the sentiment proper to the utterance is expressed by pauses, tones, emphasis, &c. Recitation from memory is another form of reading, the matter being delivered from a mental transcript. This mode is highly favourable to oratorical effect, but it is limited in application, and untrustworthy where exactness of phraseology is important. Speaking from spontaneous composition is the highest form of oratory. The qualities requisite for these arts are very different.

To read well involves a perfect understanding of the construction of sentences, and ability to analyse complex forms of composition, and discriminate between essential and expletive words; it also involves a nice perception of the qualities of modulation, and their relation to expressiveness, together with ability to regulate the voice so as exactly to suit the sound to the sense. The study of the art of reading is thus valuable as a means of improvement in composition, as well as for its influence in refining the taste, and exercising all the faculties of perception, expression, and adaptation.

In good reading, the thoughts of the writer must first be taken into the reader's mind, and then delivered as the writer himself might have uttered them immediately on their conception. Children, when set to read language above their comprehension, are of necessity merely mechanical readers; and in this way they acquire habits of unintelligent reading, which are seldom perfectly thrown off in after-life. In silent reading, or the perusal of language for our own information, we gather the sense as we proceed, and correct misapprehensions by reflection; in reading aloud for the information of others, we must perfectly comprehend the matter before we utter it, so as to avoid misleading the hearer. A practised reader can, no doubt, exercise sufficient prevision at the time of reading, by keeping his eye in advance of his utterance, to read any ordinary composition fairly at first sight; but for public reading this would be insufficient. Whatever is to be read in public should first be well studied in private. The reader thus knowing definitely what he has to express, will give forth no uncertain sounds, and his manner will have the freedom of memoriter delivery, without the disadvantage of its constraint upon the mind. His whole attention will be concentrated on the object of his reading, the effective *conveyance* of the matter and spirit of the composition. The presence of the book before him will be necessary chiefly to give confidence, and prevent the possibility of rambling. The eye, assisted by memory, will take in clauses and even sentences at a glance, so that it may be freely raised during utterance. If the eye of a reader is fixed on the book, he seems to be perusing it for his own information; but if he look his hearers in the face, as, with due preparation, he should be able to do, his delivery may have all the qualities of spontaneous oratory, and be to the hearers speaking rather than reading. This effectiveness is rarely exemplified, because the requirements for public reading are so little understood, and so habitually neglected in our systems of education. The

tameness, monotony, and rhythmical sing-song so generally associated with reading, have created a prejudice against the use of 'paper' in pulpit addresses, in consequence of which, in some churches, the practice of reading sermons is discountenanced, while in others it is positively interdicted. The quality of sermons, as compositions, is seriously impaired under such circumstances; but the cure for bad reading—against which the prejudice is directed—is *good* reading. All men cannot be orators, but all may be taught to read oratorically; and were students systematically trained in this art, the services of the church would be rendered far more attractive and influential. In the absence of this training, preachers are the most ineffective of public speakers; and discourses prepared to be delivered from memory are among the meanest species of literary compositions.

The chief points of difference between ordinary reading and the utterance of spontaneous composition, are the uniform force and time, and continuative tones of the former, as contrasted with the reflective breaks and varying modulations and emphases of the latter. The speaker feels what he wishes to say, and he conveys with definiteness the felt relation of each word to the idea which is dominant in his mind. Expletive and explanatory phrases are given parenthetically; ellipses, interpolations between grammatically related words, similes, quotations, and all other elements of rhetorical style, are indicated by changes of modulation; and the *point* of every sentence is made unmistakably apparent. The reader sees all the parts of a sentence level to his eye, and he is apt to deliver them with a corresponding indiscriminativeness of manner; either without variety of time, tone, and stress, or with mere alternation of force and feebleness, or the equal indefiniteness of emphasis on every phrase.

The first requisite for effective reading is a clear conception of the author's intention, together with such a command of the voice as may enable the reader to express that one meaning to the exclusion of all other possible meanings. For every cluster of words is like a many-sided crystal, which may be made to throw light from any of its facets, according as one or another of them is presented uppermost. The most prominent word in the utterance of a sentence is not necessarily the most important grammatical word, but that which is new in reference to the context; and such words as are already before the mind—whether directly stated, inferentially included in former expressions, or otherwise implied—are pronounced with subordinateness of manner. Thus, in the following lines:

> The quality of mercy is not strained,
> It droppeth as the gentle rain from heaven
> Upon the place beneath. It is twice blessed:
> It blesseth him that gives and him that takes.

If the first line were read independently, it would be emphasised as follows:

> The quality of *mercy* | is not *strained;*

but if read in connection with the preceding context, the emphasis would be different. Thus:

> *Portia.* Then must the Jew have mercy.
> *Shylock.* On what compulsion must I? Tell me that.

'Mercy' and the 'compulsion' of mercy being thus already before the mind, the chief point in Portia's reply will now be:

> The quality of mercy *is* not strained,
> It droppeth, &c.

But, as to 'drop' is the natural characteristic of 'rain,' and as rain always falls 'from heaven,' and necessarily 'upon the place beneath,' these implied words will be pronounced subordinately; thus:

> It droppeth as the *gentle rain* from heaven
> Upon the place beneath.

Bearing in mind, further, that mercy is of necessity 'blessed,' the reader will proceed:

> It is *twice* blessed;

and as the object of the speech is to *solicit* mercy, he will give prominence to the word that advances the suit. Thus:

> It blesseth him that *gives*, and him that takes.

On this principle, the reader shews that he has, in his own mind, performed the writer's process of thought, and so made the language which he interprets virtually his own. But in order to express with definiteness the thoughts and sentiments thus adopted, the reader must have the *instrument* of expressiveness perfectly under control. His voice should have no more predisposition to any particular tune than the flute or violin of a musician. Tones have an inherent value, which is above and independent of language, so that assertive construction may be made to convey interrogative meaning, and interrogative language may have assertive or imperative force. The modulations of the voice unravel all the complexities of composition, separating words from their immediate context, or connecting them with others from which they are most widely separated in the sentence. Thus, in the following lines:

> Slowly and sadly we laid him down,
> From the field of his fame fresh and gory,

the clause 'fresh and gory,' is, by relative modulation, shewn to refer to 'him' in the preceding line, and not to the nearer words 'fame' or 'field.' So, also, in the following passage: 'And they came with haste, and found Joseph and Mary, and the babe lying in a manger.' Here the series, 'Joseph and Mary | and the babe' is divided by a modulation of the voice, so as to shew that the last word 'babe' is alone the grammatical antecedent to the clause 'lying in a manger.' From such illustrations it will be obvious that good reading involves close thinking, and that the governing qualities of tone demand accurate appreciation and careful culture.

The tones of the speaking voice are all more or less *inflected*, in which respect they differ essentially from singing tones, which are level, and only varied in pitch. The term 'modulation,' as understood by elocutionists, has reference to the general pitch of the vocal inflections in a passage. The inflections themselves are all either rising or falling. The rising turn of voice carries on the hearer's attention to what is to *follow*—the falling turn directs attention to what has gone *before;* the former asks, or appeals to the hearer—the latter affirms or enjoins from the speaker; the former is negative—the latter is positive. Simple inflections rise or fall directly from their accentual pitch to their termination, and the range of the inflection may have any extent, from less than a semitone to more than an octave. The strongest rising tones are expressive of interrogation, incredulity, or entreaty, and the strongest falling tones of affirmation, assurance, or command. Compound inflections unite the two vocal movements—falling before a rising termination, and rising before a falling termination—with one accentual impulse; and the effect of this opposition of tone is to add to the expressiveness of the termination a suggestion or *inference* in accordance with the expressiveness of the commencing turn. Thus: 'Not ŏne,' with compound rising tone,

implies 'but more.' 'Even due,' with compound falling tone, implies 'and not more.'

The emphatic force of tones depends on their accentual pitch in relation to that of preceding tones, as well as on the extent and the direction of the inflection. The amount of possible variety in these degrees is exceedingly great, but the peculiar expressiveness of individual modes of inflection is definite, traceable to systematic principles, and of limited extent, depending principally on three qualities—

1. Rising or falling accent as well as termination; as Cónstánt, Constànt.
2. Rising or falling accent with opposite termination; as Cǒnstánt, Cônstànt.
3. Accent higher or lower than preceding pitch; as To die? To sleep. To sleep? Perchance to dream.

These three sources of vocal variety the student of elocution should have under ready and perfect control.

The art of elocution has received comparatively little attention in modern times. The value of a good delivery is certainly not less now than it was among the orators of ancient Greece and Rome; but the assiduity with which the art was cultivated by the latter, and the estimation in which it was held by them, present a strong contrast to the negligence and apathy of modern speakers in regard to delivery. This fact is not easily accounted for; the influence of elocution being such, that an inferior address well delivered never fails to create a stronger impression on an audience, than the most masterly composition that lacks the graces and enforcements of effective utterance and action.

The model for effective reading is to be found in the ordinary style of animated conversation. The speaker's tones are not governed by the laws of punctuation, or by formal grammatical periods. Every clause in a sentence is, to the speaker, a period. The most complex sentence is only an aggregation of correlative sentences, each of which is a separate act of thought, and should be delivered as such in reading, as it always is in speaking. Modulation will shew the relation of each part to the whole, but inflection should at the same time shew each part to be in itself complete, as the statement of a distinct though subordinate fact or circumstance.

The rules which some elocutionists have laid down for the reading of sentences, are clearly at variance with this natural principle of intonation, and they lead to an artificiality of manner which is at best a pedantic tune. The formal arrangements of inflections which have been gravely prescribed for 'simple' and 'compound,' 'commencing' and 'concluding' serieses, 'penultimate' and 'antepenultimate' clauses, &c., have done much to discourage students from paying proper attention to the art of elocution, and have almost justified the denunciations of some authors, who have declared elocution to be altogether unworthy of study. Thus, Archbishop Whately, in his disgust at the jerking alternations of ups and downs prescribed in elocutionary rules, counsels students to have nothing to do with rules, but simply to be 'natural.' 'To be natural, however, is to follow those laws or principles which undoubtedly are to be deduced from the operations of the voice in spontaneous speaking; and these must be studied by all who would be 'natural' in practising the art of reading. In elocution, as in painting and in every art, the highest attainment of the finished artist is to be natural. Nature and art are not opposites; the former is the *end* of the latter; the latter the *means* to the former. To be natural does not 'come by nature,' but by art; and 'art itself is nature.' Elocution, therefore, is none the less 'natural,' that it must be studied as an art; and the study of this art is not justly to be contemned, whatever condemnation may be due to the errors of elocutionists.

To acquire a natural style of reading, the chief point to be attended to is the logical clausing of sentences, so as to present, with separate completeness to the hearer's mind, every fact and every associated circumstance, whether principal or subordinate. Punctuation is not a sufficient guide for this purpose; it will sometimes even mislead. Thus, in the following sentence from Macaulay's *Essay on Milton*: 'Even when a system has been formed, there is still something to add, to alter, or to reject'—the logic of the sentence is not brought out by the punctuation. The reader should make a modulative break after the word 'something,' where no comma is placed, and he should, notwithstanding the separating commas, unite the three subsequent clauses by a modulative tie, to shew their expletive nature, and the equal relation of each of them to their common antecedent. Thus: 'There is still *something* | to add, to alter, or to reject.'

In the following sentence from the same Essay, no comma occurs, but the reader will nevertheless divide the period into at least three modulative clauses: 'The blaze of truth and liberty | may at first dazzle and bewilder | nations which have become half blind in the house of bondage.' Here the first section contains the *subject* of the sentence, the second the *predicate*, and the third the *object*, with its dependent clauses. It is to be observed that the object 'nations' is separated from its governing verb 'bewilder,' only because the former is itself the governing antecedent to a new but subordinate sentence.

These illustrations are sufficient to shew that the clausing of sentences for effective reading is dependent on a different principle from that which regulates punctuation.

Nor is any particular mode of vocal inflection necessarily associated with any of the marks of punctuation. This is particularly to be noted in connection with the sign of interrogation. The position of this mark, too, at the end of a period often misleads readers into an unnatural tone. The interrogative part of the sentence may not extend beyond a single clause, and this may be followed by many clauses within the same period. The mark of interrogation would therefore be better placed at the beginning of a sentence. But, as above shewn, interrogative language may sometimes require for its just expression any one of all the tones in the gamut of speech. Thus: 'Will you?' If pronounced with a simple rising tone, this question asks or appeals; and with an extended range of inflection, it expresses doubt or surprise. But the form of words does not necessitate the rising tone. Thus: 'Wìll you?' If pronounced with a simple falling turn, the question expresses desire or expectation on the part of the speaker; and with an extended range of inflection, it conveys more or less of authoritative injunction.

The same question may legitimately, also, take either of the compound forms of inflection. Thus: 'Wǐll you?' If pronounced with a compound rising turn, it infers some cause of opposition or hindrance; and with an extended range of inflection, insinuates more or less of threatening or penalty. With a compound falling tone, thus: 'Wîll you?' it suggests more or less of defiance and contempt,

according to the pitch of the commencing turn, and the extent of the concluding inflection.

The principles of vocal expression, clausular pronunciation, emphasis, &c., as above sketched, apply equally to speaking as to reading; but it is in connection with the latter chiefly that they require to be studied, as they are generally applied instinctively in spontaneous speaking, even by those who are most enslaved by vicious habits in reading. The management of the voice, however, should be more than an instinct to the orator; and there is much in the philosophy of vocal expression that will be studied with equal advantage by both speakers and readers.

Extemporaneous speaking is greatly assisted by a good habit of elocution, and it is at the same time strongly conducive to the formation of such a habit. The deliberate utterance which weighs every phrase, gives the mind time to revolve its ideas, and choose the most effective words for their expression; and the evolution of a continuous train of thinking in coherent sentences compels deliberation and guarded delivery. But while the grandest triumphs of oratory are thus to be achieved, the requisites for success are such that great orators must ever be few in number. The ancient rhetoricians describe their model speaker as one who is accomplished in all knowledge, and esteemed for every virtue, and who has devoted more than the average duration of human life to laborious preparation; for they held that the oratorical faculty could not attain its full development and influence until hoary hairs had added the venerableness of age to a reputation for learning, sagacity, and unimpeachable morality.

Speaking from memory admits of the application of every possible element of effectiveness, rhetorical and elocutionary; and in the delivery of a few great actors, the highest excellence in this art has been exemplified. But speaking from memory requires the most minute and careful study, as well as high elocutionary ability, to guard the speaker against a merely mechanical fluency and thoughtlessly rhythmical utterance. This mode of delivery is therefore only appropriate to special efforts, for which due preparation can be made. Otherwise, memoriter delivery—as of sermons composed and learned at the rate of one or two every week—is altogether incompatible with excellence either of matter or of manner.

That the art of reading, which is on all accounts worthy of the highest position among the exercises of students for the oratorical professions, should be so utterly neglected in our systems of education, is a reproach to the enlightenment of our age; and it is especially a scandal to our universities, in which the examples of the famous orators of antiquity, and the lessons of their experience, are so fully known, yet practically dishonoured.

RE'AL is a phrase much used in the law of the United Kingdom in combination with various other terms. In the law of England and Ireland, real property or real estate, or realty, constitutes one of the great subdivisions of all property, consisting of what is popularly known as land and houses, which are not legal terms; personal property, or personalty, includes all the other kinds of property, as goods and chattels, money, &c. The same or a similar distinction pervades the laws of all countries. In the Roman law, things were divided into movable and immovable. In the law of Scotland, the division is into heritable and movable. The division into realty and personalty comes into operation in the event of the death of an owner of property, especially when he dies intestate, in which case his realty goes to the heir-at-law, and the personalty to his administrators or executors. See SUCCESSION. A division also exists in England of actions into real and personal actions, the object of the former being to recover real property, and of the latter to recover damages, or the possession of personal property; while there is also a class of actions called mixed actions, which partake of the nature of both. With regard to chattels, there is also a subdivision into real chattels and personal chattels, the former consisting of contracts and interests affecting real estate, such as leases and mortgages, while personal chattels include corporeal movables. Then there is a division of assets into real assets and personal assets, the former being the real estate, so far as it can be made according to the rules of law liable for the debts of the deceased. In Scotland, the word is also frequently used technically, though not in the same sense as in England. Thus, real actions in Scotland mean actions the object of which is to recover possession of the property itself, whether heritable or movable, and a real right is a right to the property itself in a like sense. A real burden, in the law of Scotland, means the right to a sum of money, or other obligation, so secured on land that the land cannot be sold or alienated except as subject to the burden, and until the burden is discharged.

RE'AL, a silver coin and money of account in use in Spain, Mexico, and other old Spanish possessions. In Spain, it is the $\frac{1}{20}$th part of the piastre (*peso-duro*), is equivalent to 34 maravedis (an imaginary copper coin), and varies with the rate of exchange, from $2\frac{1}{2}d.$ to $3d.$ sterling. Of the old Spanish reals now disused, the *real de plata* was the $\frac{1}{8}$th of the piastre or *peso duro* (see PIASTRE); and the copper-real or *real de vellon*, was the $\frac{1}{20}$th part of the piastre. The real was first coined in Spain in 1497, and has since that time frequently varied in value. At the present day, in Mexico, Peru, and the Central American Republics, the piastre is divided into 8 reals, and silver coins of one real are current, while in New Granada, it is divided into 10 reals, and silver reals and half-reals are coined. The real is also a money of account in Portugal, being the equivalent of 40 reis; and in Batavia, it is the name of a weight for gold and silver articles corresponding to 17 dwts. 14 grains troy weight.

REA'LGAR, a mineral consisting of about 70 parts of arsenic and 30 of sulphur. This native sulphuret of arsenic is of a very brilliant scarlet colour, generally translucent, but sometimes transparent; and occurs in the vicinity of volcanoes, and in many igneous rocks; massive, disseminated, or crystallised. Its crystals are prisms, sometimes needle-like. It yields to the pressure of the nail.

RE'ALISM. See NOMINALISM.

REAL PRESENCE, in the Eucharist, a doctrine forming an article in the belief of the Roman, the Greek, and other Eastern churches, and of some bodies or individuals in other Christian communions, according to which it is held that, under the appearance of the Eucharistic bread and wine, after consecration by the priest, Christ himself is really and substantially present, body and blood, soul and divinity. The word *really* is used in opposition to 'figuratively;' and the decree of the Council of Trent, which is the authoritative expositor of the Roman Catholic belief, conjoins with that word the terms 'truly' and 'substantially,' the former being used in order to exclude the notion of a barely *typical* representation, such as is recognisable in the Paschal Lamb and the other Messianic types of the Old Law; and the latter for the purpose of meeting the view ascribed to Calvin, that Christ, as apprehended by the faith of the believer, was, for such believer,

rendered virtually present in the Eucharist, and that his body and blood were received in virtue and efficacy, although not in corporeal substance. The belief of the Roman and Eastern churches as to the reality of the presence, was shared by Luther, who, however, differed from Catholics as to the mode; and has always been followed also by one school of divines in the Anglican Church, whose doctrine became very prominent in the time of Laud, and has been revived in the late Tractarian movement. But between Catholics and all the non-Catholic schools of whatever class, one marked difference exists. According to the former, the presence of Christ in the consecrated Eucharist is *permanent;* so that He is believed to be present not alone for the communicant who receives the Eucharist during the time of his communion, but also remains present in the consecrated hosts reserved after communion. On the contrary, all the Lutherans, and almost all Anglicans, confine their belief of the presence to the time of communion, and all, with hardly an exception, repudiate the worship of the reserved elements, as it is practised by Catholics.

The question as to the *reality* of Christ's *presence* in the Eucharist is quite distinct from that which regards the *mode* of the presence, for which see TRANSUBSTANTIATION.

REAM, a certain quantity of paper, consisting of 20 quires, each quire containing 24 folio sheets. A *printer's ream* should consist of 21½ quires. The word appears to be derived from the Saxon *ream*, a band, and was probably applied in consequence of the bundle of paper being held together by a band.

REAPING, the act of cutting corn, has been performed from time immemorial with an instrument called a reaping-hook or sickle. The sickles in use among the ancient Jews, Egyptians, and Chinese appear to have differed very little in form from those employed in Great Britain at the present day. The reaping-hook is a curved instrument of about a foot and a half in length, tapering from a breadth of about two inches at the but-end, where it is fixed into a wooden handle. The edge is sometimes serrated, but, as a rule, it is now made plain and sharp like a knife. In reaping, the harvester takes the corn in his left hand, and then with the hook cuts the stalks as close to the ground as possible; but when a grass crop has been sown down with the grain, it is thought judicious to leave the stubble of greater length, in order to preserve the young grass. The corn is placed handful by handful in a band usually made of the corn, and when as much has been cut as will form a sheaf, it is tied up by the 'bandster.' The most expert reapers slash down the corn with the hook in the right hand, using the left merely to keep the corn from falling, until sufficient to make a sheaf has been cut, when the reaper places his hook under the corn, and supporting it with his left arm, deposits it all at once in the band. The middle person on the ridge usually makes bands for other two reapers; and a bandster (one to every *three* or *four* reapers) binds the grain, and sets it up in shocks or stooks of 8—12 sheaves.

In the principal corn-growing districts of Scotland, a great proportion of the reaping by hand is done by labourers from Ireland, who, of late years, frequently take the work at from 8*s.* to 15*s.* per acre, with board and lodging in addition. Their fare is of the simplest kind—consisting, in the majority of cases, of porridge morning and evening, and bread and beer for dinner; their lodging at night is the barn or some outhouse, the farmer providing coarse blankets for covering. The quantity of porridge consumed at each meal by these people is sometimes astonishing—no less, as has been proved by actual weighing, than 5 lbs., with 1¼ lb. of milk besides. Frequently these reapers are engaged at so much per week, with food. In England, most of the corn is cut by piece-work, at prices varying from 10*s.* to 18*s.* per acre. On the stronger lands of the midland and southern counties the stubble is often left knee-high, and afterwards at leisure cut by the scythe, or with a long hook, at a cost of 2*s.* per acre. In Yorkshire, Derbyshire, Oxfordshire, and on many of the lighter soils in other counties, the operation of fagging or hacking, to be afterwards noticed, is preferred as being more expeditious than reaping. A good hand will get down from one-third to one-half of an acre of wheat, and will often consume during his long day's labour, two gallons of good ale.

The scythe, in some counties, is preferred to the sickle. The most common varieties are: the Hainault scythe—an importation from Belgium—the cradle scythe, and the common scythe fitted with a cradle. The Hainault scythe consists of a blade about 2 feet 3 inches long, having a handle 14 inches long. This the mower holds in his right hand, while in his left he carries a hook, with a handle of about equal length. 'The reaping,' says Mr Henry Stephens, in his *Book of the Farm*, 'is done by pressing the back of the hook with the left hand against the standing corn, in the direction of the wind, and by cutting with the scythe close to the ground against the standing corn with a free swing of the right arm,' the hook keeping the cut corn from falling until a sufficient quantity to form a sheaf has been cut. This operation is practised in many parts of England, and especially on the lighter soils, under the name of fagging or hacking, the reaper sometimes using in his left hand, instead of the hook, a stout crooked stick from 2½ to 3 feet long. Beans and oats are the crops most generally fagged. The cradle scythe is composed of a blade about 3½ feet long, attached to a principal helve or sned about 4 feet long, into which another helve of about 3 feet in length is tenoned, thus making two handles. The cradle or bow is a piece of wood jointed to the heel of the blade, into which are inserted three or four wooden teeth, in a line with the blade, the object of which is to secure the grain being laid evenly in one direction. By the scythe, corn can be cut at a less cost per acre than with the hook; but in some quarters there is an opinion that the work is not so neatly done. In the midland and southern counties of England, the scythe in general use is of larger size, and has only one long handle. With it most of the oats and barley are cut, and in some localities these crops are left unbound in the swath like hay, and, after a few days, turned over, placed in cocks, and carted home loose. In Bedfordshire, Hertfordshire, and some of the eastern counties, the whole of the cutting, until the introduction of reaping-machines, was done by these scythes; and on many of the larger farms, the workmen undertook the whole of harvest operations, from the cutting of the crop to the thatching of the ricks, at prices varying from 18*s.* to 25*s.* per acre.

The process of reaping with either the sickle or the scythe is, however, both tedious and expensive; and hence, during the last three-quarters of a century, many attempts have been made to accomplish the work by machinery—attempts which, in the course of the last ten years, have been crowned with complete success. Reaping by machinery, however, is no modern invention. Pliny the Elder, who was born early in the 1st c. of the Christian era, found a reaping-machine in Gaul. He says: 'In the extensive fields in the lowlands of

Gaul, vans of large size, with projecting teeth on the edge, are driven on two wheels through the standing corn by an ox yoked in a reverse position. In this manner the ears are torn off, and fall into the van.' Palladius, about four centuries later, found a similar appliance for reaping corn in Gaul. He gives a more detailed but similar description of the machine. The annexed cut, copied from Mr

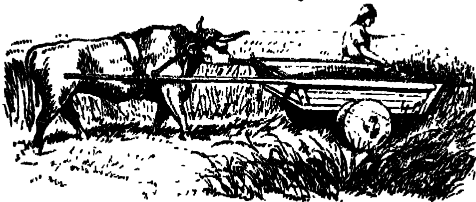


Fig. 1.—Ancient Reaping-machine.

Woodcroft's *Appendix to the Specifications of English Patents for Reaping-machines*, represents what is conceived, from the descriptions, to have been the form of this ancient reaper.

It is a curious fact, that a machine of somewhat similar construction for cutting off the heads of the grain is now in use in Australia, where straw is still of comparatively little value. The Australian machine, however, thrashes and winnows the grain at the same time.

In modern times, the idea of a mechanical reaper appears to have originated with a Mr Capel Lloft, who, in 1785, suggested a machine something after the pattern of the ancient one above described. Between that time and the Great Exhibition of 1851 in London, from which the general use of mechanical reapers may be said to date, the patents taken out for reaping-machines were very numerous. Among the most promising of these may be mentioned those of Mr Gladstone of Castle-Douglas; Mr Smith of Deanston; Mr Kerr, Edinburgh; Mr Scott of Ormiston; Mr Dobbs, an actor in Birmingham; Mr Mann of Raby, near Wigton; and the Rev. Patrick Bell of Carmylie, Scotland. In 1826, Mr Bell constructed an efficient and simple machine, which still continues in use during every harvest. This machine is propelled through the corn by horses yoked behind it; the knives or shears are on the reciprocating principle, and the corn is laid down in swaths by means of an endless web. In America, Mr Hussey and Mr M'Cormick took out patents for reaping-machines of superior character in 1833 and 1834 respectively.

The movements of the cutters of these machines were various. A few were advancing only, some sidelong and advancing, others reciprocating and advancing, a large number continuous and advancing, and others continuous and alternate. The reciprocating and advancing motion is that now employed on all the machines in use. The principal difference in the machines now so largely used for cutting corn is in the form and character of the cutters, in the mode of delivering the grain after it is cut, and in the manner of draught or propulsion.

The cutting-knives are of two kinds—one, obtuse-angled and serrated; the other, acute-angled and for the most part plain. Both are attached to a bar, and are made to work through another bar of iron fitted with hollow fingers, called guard-fingers, which, projecting forwards, catch the standing corn, and retain it firmly until it is cut. The serrated knife saws through it; the plain knife clips it, as it were; the finger-guard forming the fixed blade of the scissors. In the case of the serrated obtuse-angled knife, a reel or a rake, either moved mechanically or by manual power, is necessary to bring down the corn to the cutter. With the plain knife, this is not so much needed; and it can cut grass or clover, which the other cannot do satisfactorily. But the obtuse-angled knife requires less sharpening, is not so liable to choke, and takes rather less power to drive.

The delivery of the sheaves is effected either by manual or mechanical labour; but the vast proportion of the machines in use are what are termed manual delivery-reapers. The delivery of the sheaves can be accomplished in two ways—either at the side or at the back of the machine; but the side-delivery, by manual labour, has been found difficult in practice, and therefore has been almost quite abandoned. In delivering the grain, a man, with a short-handled rake in his hand, sits upon the machine behind the cutting apparatus. With this he inclines the grain towards the knife; and when sufficient to make a sheaf has been cut, he rakes it off the platform upon the machine, on to which it has fallen, and deposits it on the ground. The cut subjoined will illustrate the method of raking off. In making a neat and squarely-formed sheaf, the raker is greatly assisted by a hinge in the

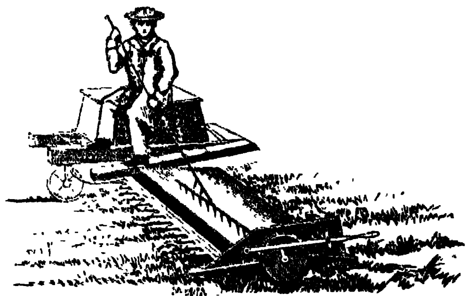


Fig. 2.—Hussey's Reaping-machine (cutting part).

platform, which enables him, by pressure of the foot, to tip the board over, so as to let the corn slide gently down. The disadvantage of a back-delivery is, that the sheaves must be tied up and removed out of the way of the machine before it comes round again. Such a reaper, therefore, always requires a full supply of hands to attend upon it, while a side-delivery might work for a whole day without more persons than the driver and the raker.

The mechanical or self-delivery machines, as they are generally called, are of two kinds—one lays the cut corn in swaths, the other deposits it in sheaves. There are several arrangements for laying it in swaths by an endless web of cloth, or by endless bands, which have now almost superseded the web, and by Archimedean screws. Web, bands, and screws all lay off the corn to the side, so that a whole field may be cut without the necessity of lifting the grain out of the track of the horses. Bell's improved machines, and Burgess and Key's M'Cormick's, are the most approved swath delivery-machines.

The automaton sheaf-deliverers best known to the public are those of Samuelson of Banbury and M'Cormick. There have been others advertised, but as yet they have not been sufficiently tried to secure the entire confidence of farmers. As Mr Samuelson's sheaf-deliverer has been more largely patronised in Great Britain than any other machine of its class, we give first a description of it, which will be made plain by the accompanying cut. The self-delivering machinery consists of a series of four

rakes—two toothed, and two plain—attached to an upright shaft, in such a manner as to admit of a free ascending, descending, and horizontal motion.

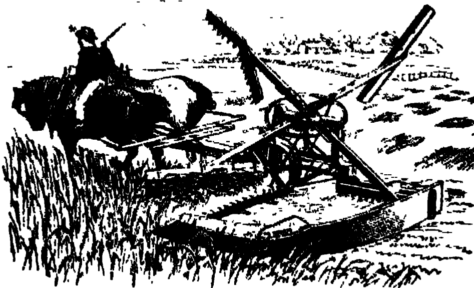


Fig. 3.—Samuelson's Self-delivery Reaping-machine.

The two toothless rakes, or 'dummies,' are shorter in the arms by six inches than the other two, and are merely employed to incline the grain towards the cutter. Upon the upright shaft, to which the rake-arms are attached, is a disc-wheel, placed horizontally, which is put in motion by another placed vertically, and deriving its motion from a pitch-chain in connection with the driving-wheel. The platform upon which the grain falls after it is cut is of quadrant shape, and is surrounded, on the outer edge, by a rim of about a foot deep. To insure the rakes passing over the platform on the level, and not obliquely, as their angular attachment to the upright shaft would imply, a nearly circular iron hoop, from three to four feet in diameter, passes round the upright shaft, upon which, as a *cam*, small iron rollers, fixed upon the under-side of the shafts of the rakes, revolve. The side of the *cam* next the platform is bent or depressed, so that the rakes, on reaching this point, make a sudden fall, or eccentric motion, thus assuming the horizontal attitude necessary to sweep over the platform on the level. The rakes are adjusted so as to lay the sheaves about 12 feet apart, to the side, and out of the way of the horses. This machine has a double-throw knife—an arrangement which reduces the driving speed, and consequently the wear and tear of the machinery; and there is an ingenious contrivance for raising and lowering the knife as occasion requires.

In M'Cormick's automatic delivery-machine, a rake is so used that 'during one part of the revolution of the gathering-reel, it acts as one of the vanes of the reel in bending the standing corn to the cutting-blades. When the rake reaches the cutting-blades in front of the platform, it ceases to revolve around the reel-shaft (which continues its rotary motion), and is made to move horizontally upon a vertical hinge, to which one end is attached (the points of the teeth being near the surface of the platform), sweeping the cut corn off at the side, and depositing it on the ground in sheaves ready for the binder. Motion is then given to the rake, causing it to rotate round the shaft of the reel; and it is brought into line with the reel-shaft at that part of its revolution when it again begins to act as one of the vanes of the reel. The mechanism by which these operations are controlled is composed of a roller, guided by an eccentric or *cam* and the necessary parts to attach the rake.'

Both these machines leave the stubble clean, and lay off the sheaves squarely; but the continuous motion in Samuelson's appears to render it less liable to breakage than the other. The price of each is about £34 or £35.

We have particularised these machines, because they supply that which is the great desideratum in reapers—a ready-made sheaf; but it would be invidious to single out names from among the manufacturers of manual delivery-reapers, as almost all these machines do the mere cutting remarkably well. The prices of these run from £16, 16*s.* to £25. It is impossible to give the number, or even an approximation to the number of reaping-machines now in use; but most farmers having a large extent of suitable land have one or two, and some even as many as four and five. One English maker annually turns out upwards of 1000.

All the machines are on the side-draught principle, save Bell's, which is propelled by direct power from behind. This machine possesses an advantage over all the others, in so far as it can commence operations in a field of grain without having a path cut for it.

The cost of reaping by machinery is much less than either by scythe or sickle. Mr Wilson of Woodhorn, Morpeth, found that the cutting of wheat with the sickle (binding and stooking included) cost him from 11*s.* to 15*s.* per acre, and with the scythe 8*s.*, whilst with the machine it only cost him 5*s.* 9*d.*, exclusive of wear and tear. From data supplied by a large number of their customers, Messrs Samuelson & Co. make out that the saving by mechanical over hand labour is, as compared with reaping, 4*s.* per acre, and with mowing, 1*s.* 9*d.* per acre; and most farmers who have tried reaping-machines set down the saving at from 30 to 40 per cent. Besides, there is about a like economy in time, which is of immense importance in a variable climate like that of Great Britain.—See Woodcroft's *Appendix to Patents for Reaping-machines;* Mr Jacob Wilson's 'Essay on Reaping-machines,' in *Transactions of Highland Society* for January 1864; *Book of Farm Implements*, and *Book of the Farm*, by Henry Stephens; J. C. Morton's *Cyclopædia of Agriculture.*

REASON, REASONING. The word Reason denotes that function of our Intelligence having reference to the attainment of a particular class of truths. We know a great many things by immediate or actual experience. Our senses tell us that we are thirsty, that we hear a sound, that we are affected by light. These facts are truths of Sense, or of immediate knowledge, and do not involve the reason. Reason comes into play when we know a thing not immediately, but by some indirect process; as when, from seeing a river unusually swollen, we believe that there have been heavy rains at its sources. Here the mere sense tells us only that the river is high; it is by certain transitions of thought, or by the employment of our thinking powers, that we come to know the other circumstance, that in a remote part of the country there have been heavy rains.

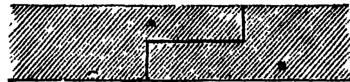
In ascertaining these truths of reason, or of Inference, as they are called, there are various steps or operations, described under different names. Thus we have (1), DEDUCTION, or SYLLOGISM; (2), INDUCTION; and (3), GENERALISATION of Notions, of which ABSTRACTION and DEFINITION are various phases. These are described under their several designations. The nature of the function or faculty denominated Reason or the Reasoning Faculty, can be explained by shewing how it results from the fundamental powers of the Intelligence. See ASSOCIATION OF IDEAS.

There is another and peculiar signification attached to the word Reason, growing out of the philosophy of Kant. He maintained the existence

of certain principles or cognitions *à priori*, or of intuitive origin, and not derived from experience, such as cause and effect, the axioms of mathematics, &c. See COMMON SENSE. It was a function of the Reason, according to him, to recognise those principles; while the generalisations of mere experience, as that water extinguishes fire, were proved by the Understanding. Other philosophers give the name 'Noetic faculty' (Greek, *nous*) to the same function. Hamilton calls it the 'Regulative faculty.'

RÉAUMUR, RENÉ ANTOINE FERCHAULT DE, a celebrated naturalist and physicist, was born at La Rochelle, in the department of Charente-Inférieure, France, 28th February 1683; and studied in the Jesuits' College at Poitiers, and afterwards at Bourges. With an eye observant of facts of every kind, and an indiscriminate thirst for information, he yet specially devoted his attention to physics, natural history, and mathematics. In 1703, he went to reside at Paris, where he speedily attracted general attention by the publication of three geometrical Memoirs on particular cases of the intersection of lines; and in 1708, he was elected a member of the Academy of Sciences, and was charged with the supervision of the work *Description des divers Arts et Métiers*, published under the auspices of the government. R. lightened his labours with occasional researches into various subjects of natural history. These researches occupied him from 1708 to 1715, and were followed by a series of investigations into the condition of the woods, gold-bearing rivers, and turquoise mines of France. His investigations into the nature of the turquoises of Languedoc led him to the discovery, that they consisted of the fossil teeth of extinct animals. The collections of Memoirs of the Academy of Sciences from 1722 till 1725 contain a number of papers by R., in which he details his discoveries of the mode of producing steel from iron (an art till that time unknown in France), of the tendency which fused metals have to become crystallised, and of the mode of tinning iron (also till that time unknown in France). For these brilliant and valuable successes, he received from the French government a sum of 12,000 livres, which he spent in promoting and encouraging the industrial arts in his native country. R.'s volatile genius next prompted him to take up the subject of pottery; and here also his ingenuity and perseverance were rewarded with success, for though he failed in successfully imitating the porcelain of China, he succeeded in producing (1739) an opaque glass, which was equal to the porcelain of Saxony and Japan. All this time, he occasionally pursued his studies in natural history, at one time propounding a mode for preserving eggs (by coating them with fat), at another giving directions for the production of fowls by artificial incubation. His invention of the *Thermometer* (q. v.) which bears his name need not be more than mentioned here. He died of a fall from a horse at his estate of Bermondière, in the department of Maine, 17th October 1757, leaving behind him a voluminous collection of works on all the subjects above stated, also a treatise on 'the silk of spiders,' which was translated into Manchu by the command of the Emperor of China; and a number of Memoirs (1731—1740), containing his thermometric researches on air, and on mixtures of fluids with fluids or solids. But by far his most important work is the *Mémoires pour servir à l'Histoire des Insectes* (Amsterdam, 12 vols. 1737—1748), which embodies a number of original observations and discoveries concerning the habits and instincts of insects, sufficient of itself to immortalise their author. Only six volumes of this work have been published, the seventh being very incomplete at the period of the author's death. While collecting materials for this great work, he kept numerous insects of all kinds in his garden, in order to have every opportunity for observing them. The Academy of Sciences obtained, by the terms of R.'s will, his collections of minerals and plants; materials for a History of Quadrupeds and Birds, afterwards made use of by Brisson and Buffon; a History of Arts, in MS.; and an immense number of finished and unfinished MS. Memoirs.

REBA'TE, a longitudinal groove, cut in a piece of timber, to receive the edge of another piece, or the ends of a number of pieces of wood. A notch,



Rebate.

such as that in a door standard for the door, as in the fig., is also called a rebate. In Masonry, such a joint is called a joggle.

REBA'TED, in Heraldry, having the points broken off or cut short.

RE'BEC (anciently *rubèbe*, or *rebelle*, Arabic, *rêbab*), an ancient musical instrument of the violin kind, of which the body, instead of consisting of two hemispherical enlargements, like other instruments of the same tribe, was narrow towards the neck, and gradually enlarged till it rounded off at the lower end. It had a bridge and three strings tuned in fifths, and was played with a bow. The earliest known representation of the rebec, however, taken by the Abbé Gerbert from a MS. of the 9th c., gives it but one string. The Moors introduced this instrument from the East into Spain, whence it spread over the rest of Europe, and was the precursor of the violin. The four classes of rebecs, treble, alto, tenor, and bass, were favourite instruments of the minstrels of the middle ages, and were used both for the dance and to accompany street-singing. Milton, in his *L'Allegro*, characterises this instrument as the 'jocund rebec.'

REBE'LLION (Lat. *rebellio*, from *bellum*, war, a revolt by nations subdued in war), an openly avowed renunciation of the authority of the government to which one owes allegiance, or a levying of war to resist the authority of the government. Unlike insurrection, which may be merely an opposition to a particular law, rebellion involves a design to renounce all subjection to the state. *A commission of rebellion* is a commission awarded against a person who treats the sovereign's authority with contempt, by not obeying his proclamation according to his allegiance, and refusing to attend his sovereign when required. It consists of four commissioners, who are ordered to attack the rebel wherever found. In Scotland, by a legal fiction, a debtor disobeying a charge on letters of horning to pay or perform in terms of his obligation, was accounted a rebel, as being disobedient to the sovereign's command contained in the writ. This disobedience was called civil rebellion, and the penal consequences of actual rebellion followed it, until they were abolished by 20 Geo. II. c. 50. By the old form of diligence (which is still competent), it has therefore been said that debtors were imprisoned not for debt but for rebellion. This fiction was discarded in the provisions of the statute 1 and 2 Vict. c. 114, simplifying the form of diligence and the steps by which imprisonment for debt is effected.

The expression 'The Great Rebellion,' is generally applied in England to the revolt of the

Long Parliament against the authority of Charles I. It began with the votes of the two Houses regarding the militia in 1642, by which they endeavoured to seize the military power of the country, and the departure of the king for York, which was immediately followed by the breaking out of hostilities. The civil war was, properly speaking, terminated by the submission of Charles to the Scots, in April 1646; but the period of the rebellion is usually held to include the Commonwealth or Protectorate, and to extend to the restoration of Charles II. in May 1660.

The revolts in behalf of the House of Stuart in 1715 and 1745 are often, particularly in Scotland, spoken of emphatically as 'The Rebellion.' The former rising in favour of the Chevalier de St George, son of James II. of England, called the Old Pretender, was headed by the Earl of Mar, and put down in 1716: the latter was led by Prince Charles Edward, known as the Young Pretender, who, landing in the Hebrides, was joined by the Highland chieftains and numerous followers, and after taking possession of Edinburgh, and marching to Derby, retreated into Scotland, and was defeated with great slaughter by the Duke of Cumberland at Culloden, on the 16th of April 1746.

RE'BUS, an enigmatical representation of a name or thing by using pictorial devices for letters, syllables, or parts of words. The term probably originates from the device speaking to the beholder *non verbis sed rebus*. Devices of this kind, allusive to the bearer's name, were exceedingly common in the middle ages, particularly in England. In many instances, they were used by ecclesiastics and others who had not a right to armorial ensigns. Thus, on the rector's lodgings at Lincoln College, Oxford, erected in the 15th c., to which Thomas Beckyngton, Bishop of Bath and Wells, liberally contributed, is carved the rebus of that prelate—a beacon and tun, with *T*, the initial letter of his Christian name. In Westminster Abbey, Abbot Islip's chapel gives two forms of his rebus—one, a human eye, and a small branch or slip of a tree; the other, a man in the act of falling from a tree, and exclaiming, 'I slip!' Many of the monograms of the artists of the middle ages and early printers were rebuses. That of Ludger von Ring was the letter *L* inserted into a ring. A large proportion of the early coats of arms were rebuses on the names of the bearer of them, as, for example, three salmons for the name of Salmon, a lock and heart for that of Lockhart, three skenes or dirks for Skene. Family badges are also frequently of the nature of a rebus, and mottoes, as *Ver non semper viret* of the Vernons.

RÉCAMIER, JEANNE FRANÇOISE JULIE ADELAIDE BERNARD, DAME, perhaps the finest representative specimen, in later times, of that character peculiarly French, the 'woman of society,' the potentate in petticoats, who sways the *salon*, and out of it becomes in doing so a sort of 'unacknowledged legislator'—was born at Lyon in December 1777. Her father was a banker of that city, and, as well as her mother, was distinguished by much of the personal grace and charm which, in the daughter, seem to have culminated, as it were, in a form of almost typical perfection. She was beautiful, and in rare measure possessed, as the soul of her beauty, the woman's indefinable fascination, the *je ne sais quoi* of her country. She was educated under the charge of an aunt in the convent of La Déserte; and at about the age of 15, she went to Paris to join her parents, who had some time before migrated thither. Shortly after, she was married to M. Jacques Récamier, a rich banker about thrice her own age. The union is said to have been scarcely in the ordinary sense connubial ('M. Récamier n'eut jamais que des rapports paternels avec sa femme'); but a mutual affection and respect informed it from the first, and consecrated it to the end, as passion might possibly have failed to do. A record of the splendid social triumphs of Madame R. would involve notice of nearly all that was distinguished in Paris during a space of about fifty years. In that strange, impalpable, yet most real way, of which, in this country, we can have only a faint and also coarse conception, she became a power, and she continued so; and this despite changes of fortune, which, among *us*, would have involved the extinction of even a more solid celebrity. To the famous Madame de Staël, she was bound by ties of extreme affection and intimacy; and when her friend was banished from Paris, as having drawn on her the little jealousy of Napoleon, she lavished her sympathy on the brilliant exile. Sometime after, the complete ruin of her husband's fortunes induced her to accept an invitation from Madame de Staël to join her at Coppet in Switzerland (1806). Here she was thrown into the society of Prince August of Prussia, and a mutual attachment ensued. It is supposed that, of all her innumerable admirers, he alone succeeded in touching her heart. A marriage was arranged, the necessary condition of which was the consent of M. Récamier to a divorce. This was not refused; but his mild and touching remonstrance sufficed to divert from her purpose a woman, on the one hand, of generous and noble feeling, and probably, on the other, constitutionally incapable of any very vehement passion. The man whose brilliant prosperities she had shared, she shrunk from deserting in the decay of fortune which had by this time befallen him. The devotion of her princely lover continued till his death in 1845; but it does not appear that after his first distinct failure—though he frequently again met his beloved—his efforts to secure her were very vigorously renewed. The lady's genius for love does not seem to have been great; but for friendship, it was almost unexampled. The most distinguished *ami* of her later years was M. de Chateaubriand, who solaced himself in his peevish decline by an almost daily visit to her. In 1846, he became a widower, and he then wished to marry Madame R., a widow since 1830; but the lady declined the honour—wisely for herself and for M. de Chateaubriand. Till the last day of Chateaubriand's life, he found—though his hand had been refused by her—in the friendship of Madame R., almost his only source of cheer and satisfaction. Chateaubriand died July 4, 1848, and Madame R. followed him on the 11th May 1849. She died not so much of grief as of cholera, a disease of which her dread had always been great; and dying, she left behind her a reputation which must continue to give her a historic place among the French Queens of Society. If not quite so brilliant as some of them, she was obviously much more correct than most, on a ground of virtue or of coldness. Specially brilliant she was not; but she seems to have moved in some atmosphere breathed about her of bewildering charm and fascination. Passion, in its fiercer sense, she had not in herself, nor does she seem much to have inspired it; but the genius of refined *philandering*, as it is termed, was probably never more exquisitely embodied. See *Souvenirs et Correspondance tirés des Papiers de Mme Récamier* (Par. 1859).

RECEI'PT is the technical as well as popular term signifying a legal acknowledgment of money received in discharge of a debt or demand. It is often popularly believed that a written receipt is the only legal proof of payment; but this is a mistake, the fact being that it is only one mode of proving

it. If the money be paid in presence of witnesses, or even without witnesses, provided a jury or judge believe the statement on oath of the party paying it, this is, in England, quite as good evidence of the payment as if a written receipt were given; and even a written receipt is not conclusive, for it is subject to explanation, and if it was obtained in advance of a payment which never followed, or by fraud, it goes for nothing as a discharge of the debtor. If a receipt is in writing, and the sum paid exceeds 40s., it must be stamped with a penny receipt-stamp (which may be an adhesive stamp), otherwise the receipt is inadmissible as evidence of payment. Not only is a receipt proper subject to stamp-duty, but also any note or memorandum given to a person on payment of money, and acknowledging payment of any part of a debt or demand, whether signed or not; so receipts given on payment of bills of exchange or promissory-notes, are liable to stamp-duty. But there are several exceptions from liability to stamp-duty. Such are receipts for deposits with bankers (except when paid on allotment of shares, or in respect of calls on shares); receipts as to the assessed taxes—for land-tax, income-tax, and payments to the crown; receipts by officers, seamen, marines, or soldiers for wages or pay; receipts for purchase of government stock; receipts written on the back of duly stamped bills of exchange or promissory-notes, or upon the back of duly stamped purchase-deeds. Where a debtor tenders money, but requires a stamped receipt at the same time, he ought to provide himself with paper, and stamp, and writing materials, for the creditor is not bound to supply these. In Scotland, the receipt of money cannot be proved by witnesses, where the debt was created by writing, and it is not allowed to dispute the validity of a written receipt, except in cases of fraud.

RECEIVING STOLEN GOODS is a criminal offence, distinct from larceny. It implies that the goods were received with the knowledge that they were stolen. The offence is felony, and punishable with penal servitude from 3 to 14 years; or 2 years' imprisonment, with or without hard labour. In cases where the stealing is only a misdemeanour, then the receiving is also only a misdemeanour; and where the taking of property is an offence punishable on summary conviction, the receiving with knowledge is punishable in the same way. It is sometimes extremely difficult to distinguish between the case of a receiver and of one who is a party to the stealing, or a principal. The thief may be a witness against the receiver.

RECENT or HUMAN PERIOD, in Geology, is the title given to the epoch that has elapsed since man made his appearance on the globe. The causes that operated throughout the ages of geological time to produce the changes recorded in the various sedimentary deposits, did not terminate with the beginning of human history, but have been ever acting since man was able to observe and to record his observations, and are still in progress around us. The solid earth is being washed away by atmospheric agency, and the abraded portions are continually carried away slowly and imperceptibly by streams and rivers, to form new deposits in the depths of inland lakes or of the ocean. Volcanoes are throwing up lava and scoriæ, and earthquakes are elevating portions of the earth's surface in one place, and depressing them in another; and plants and animals are, either with their living bodies, or their dead exuviæ, forming, as in past ages, deposits in various places, as in the foraminiferous ooze of the deep ocean, and the enormous coral reefs of the eastern seas, or the peat-mosses and diatomaceous earths of temperate climes. The record of all these changes, and the remains of man and of the plants and animals which the strata produced by them contain, have for some years received great attention. As they form common ground for the antiquary and geologist, they have been diligently investigated by the students of both sciences. The classification adopted for the subdivision of the Recent Period is based on what is supposed to have been the progress of human civilisation. The first rude inhabitants of a country seem to have been acquainted only with stone implements. Their hammers, knives, and spears were made of stone, sharpened by chipping the edges, and subsequently by grinding and polishing. In Denmark, these stone implements are found buried in peat-mosses, associated with the remains of plants and animals that still live in that or neighbouring countries. The common tree in these mosses is the Scotch fir, which has not been a native of Denmark during historical times. Of the same age are the 'kitchen-middens,' found on the coasts of the Danish islands in the Baltic. They are mounds of the shells of the oyster, cockle, periwinkle, and other edible mollusca, like those formed by the North American Indians on the eastern shores of the United States. The implements found in them are formed of stone, sometimes of wood and bone, but never of metal. Similar 'middens' have been described as occurring in various places in the north of Scotland. The people who built the earliest of the lacustrine habitations of Switzerland were also unacquainted with the use of metals. See CRANNOGES. The paucity or almost absence of human bones in such early deposits, whether in Denmark or Switzerland, is attributed by antiquaries to the supposed practice of burning the dead.

While the lower portion of the Danish peat-mosses is characterised by the presence of stone implements and the trunks of Scotch fir, the upper portions of the same mosses abound in trunks and acorns of the common oak, and with these are associated implements and articles of bronze. In many of the Swiss pile-buildings, the bronze implements also supplanted those of stone. The various articles exhibit a considerable advance in civilisation, as is to be expected from the using a metal, the possession of which implies the existence of foreign commerce, since tin was in ancient times only obtained from Cornwall.

In progress of time, the oak in its turn disappeared from the surface of Denmark, and was followed by the beech, which still continues to flourish luxuriantly in Denmark. The use of bronze also gradually gave way before the now discovered iron. A few of the lake-buildings seem not to have been abandoned until after the inhabitants became acquainted with the use of iron, as some articles made of this metal have been found at Nidau.

While it is useful thus to characterise the various steps in the civilisation of man, and to associate them with the strata in which they occur, it would be a source of endless error to suppose that all such strata are contemporaneous; for the various ages have really existed at the same time not only in different countries of the world, but even in contiguous regions, and probably implements of the three materials have been used at the same time by different inhabitants of the same district. See BRONZE, AGE OF. The occurrence, then, of stone implements in several deposits exhibits not a similarity of age, but a similar stage of advancement in civilisation, consequently no dependence can be placed on those calculations which trace back the iron, bronze, and stone periods as if they had

preceded each other in regular chronological series, and each had occupied a given number of years.

RECEPTACLE, in Botany, the expanded and abbreviated termination of a floral axis, bearing many flowers close together, as in the *heads of flowers* of the *Compositæ* and in the fig. The receptacle assumes a great variety of forms, and sometimes, as in the fig, becomes a chief part of the fruit. It is the eatable part of the artichoke, and the 'cheese' of thistles, so well known to schoolboys. The name receptacle is sometimes also given to that part of a single flower from which the whorls of floral envelopes and parts of fructification, or some of them, spring; which, however, is more properly called the *thalamus* or *torus*.

RECE'PTION, Religious, of monks, nuns, and other religious persons, is the ceremonial whereby they are admitted to the probationary state called the Novitiate (q. v.). Before the ceremony of reception, a short preparatory stage must be passed through by the candidate (called at this stage a 'postulant'), the duration of which usually ranges from two to six months. The ceremony of the reception, called also 'clothing,' is performed by a bishop, or a priest delegated by a bishop, and consists in blessing the religious dress or habit, and investing the postulant therein with appropriate prayers, the hair being at the same time cut off, and the secular dress laid aside, in token of the renunciation of the world and its pomps and pleasures. The reception, however, is understood to be only a provisional step; and the novice remains free to return to secular life at any time during the novitiate.

RECI'PROCAL (Lat. *reciprocare*), a term which is employed in Mathematics in a sense analogous to that attached to it in ordinary language. A geometrical proposition is the reciprocal (or *inverse*) of another, when the 'data' of the one are the 'quæsita' of the other, and *vice versâ*. In Algebra, one quantity is the reciprocal of another, when the one is the result of unity divided by the other; thus, 2 and $\frac{1}{2}$, x and $\frac{1}{x}$, $\frac{a}{b}$ and $\left(1 \div \frac{a}{b} \text{ or}\right)\frac{b}{a}$, are reciprocal quantities. The product of a quantity by its reciprocal must always be unity. *Reciprocal or Inverse Proportion*, a term formerly much used in arithmetical treatises, but now, and with much propriety, generally disused, referred to such questions as the following: If a rectangular field be 800 yards long, and 240 broad, what must be the breadth of another rectangular field of equal area which is 960 yards long?—the answer being 200 yards. In this question, we see that the breadths are not proportional to the lengths, but to the reciprocals of the lengths; thus, $\frac{1}{800} : \frac{1}{960} :: 240 : 200$; but in all such problems, it is better for the pupil to be left to exercise his judgment in applying to them the ordinary rule of proportion.

RECITATI'VE (Ital. *recitativo*, from *recitare*, to recite), a species of vocal composition which differs from an air in having no definite rhythmical arrangement, and no decided or strictly constructed melody, but approaches, in tonal succession and rhythm, to the declamatory accents of language; it is, in fact, as near an approach as possible to speech delivered in musical sounds. Recitatives are not performed in any strict species of time, the length of the notes depending on the singer, who lengthens or shortens them according to the expression required. It is, however, usual to note a recitative in common time, in order to facilitate the reading; and when any part of a recitative is to be performed in strict time, this is indicated by the words *rec. a tempo.* When a recitative is accompanied merely by a few simple chords of an instrument, to indicate to the singer the pitch and the harmony, it is called *recitativo secco* or *parlante*, declaimed recitative. When the voice is accompanied by a considerable portion of the instruments of the orchestra, either in sustained chords or florid passages, it is termed *recitativo accompagnato, strumentato*, or *obbligato*. Recitative was largely used in the ancient drama; and is used in the opera to express some action or passion, to relate a story, reveal a secret or design, &c. It is said to have been first introduced in the opera by Emilio del Cavaliere at Rome.

RECLAI'MING, in the Law of Scotland, means the appeal from a judgment of the Lord Ordinary to the Inner House. The reclaiming days are ten days after judgment, except against interlocutors disposing in whole or in part of the merits of the cause. The step by which the appeal is commenced is a reclaiming note.

RECLU'SE (Lat. *reclusus*, also *inclusus*, shut up), a class of monks or nuns who, from a motive of special penance, or with a view to the more strict observance of Christian perfection, remained shut up from all converse, even with members of their own order, in a cell or other place of strict retirement. This practice was not allowed, except to persons of tried virtue, and by special permission of the abbot; and the recluse was, with due solemnity, locked up in the presence of the abbot or the bishop, who placed his seal upon the door, not to be removed without the authority of the bishop himself. The celebrated medieval theologian, Rabanus Maurus, was a recluse, when elected Archbishop of Mentz. Nuns also were found to practise the same voluntary seclusion, especially in the Benedictine, Franciscan, and Cistercian orders. A rule, specially designed for female recluses, was composed by Ælred of Reresby, and is preserved by Holstenius in his *Codex Regularum Monasticarum*, vol. i. p. 418, and following.—In a wider sense, the name recluse is popularly applied to all cloistered persons, whether men or women, even those who live in community with their brethren.

RECO'GNISANCE is a kind of judicial bond entered into with a court of record, the object of which is to secure the doing of some act, as the appearance of witnesses at a criminal trial, or the keeping of the peace by one who has threatened or assaulted another. The form of it is thus: 'A B doth acknowledge to owe to our lady the Queen the sum of ten pounds,' or some other sum to be levied of his goods if he fail in the condition endorsed; and then a condition is added, which states that if the thing secured is done, then the recognisance is to be void. This is the mode by which justices of the peace secure the attendance of the prosecutor and witnesses at the trial of a prisoner who has been committed for trial, or the future good behaviour of one who has committed a breach of the peace. If the thing secured is not performed, then the party bound forfeits his recognisance, that is, a debt of the amount specified becomes forthwith due to the crown.

RECOI'L. When the charge of gunpowder contained in a gun is fired, the sudden expansion of the powder into many times its former bulk acts with equal force in every direction. The resistance offered by the ball, which moves more or less easily in the bore, being far less than that of the bulky and heavier gun and carriage, the ball is forced to a great distance; but the gun, with its carriage, must, nevertheless feel the reaction, and is driven

backwards a certain space, ordinarily a few feet. This retrograde motion is called the recoil, and dangerous accidents sometimes take place from it. After the recoil, the gunners have to work the piece back to its former position for the next discharge. In the Armstrong naval gun, and some other modern cannon, the trunnions of the gun are mounted on an inclined plane, up which the recoil drives them; they running down again to their original position by the action of gravity, after the discharge. Other expedients have been tried with greater or less success; among them may be cited a series of solid India-rubber buffers, which, being compressed by the recoil, drove the gun home again on recovering their shape. The gun and shot remaining the same, the recoil is proportionate to the charge.

The recoil of small-arms is known as their 'kick,' and is felt on the shoulder of the marksman.

RE'COLLET (Lat. *recollectus*, gathered together), a name given to the members of certain reformed bodies of monastic orders, whether of men or women, in the Catholic Church. Among orders of men, an offshoot of the Augustinian hermits, which, under Louis de Montaya, in 1530, obtained considerable popularity in Spain, was called by this name, and the order still exists at Medina Sidonia, Leon, and Pamplona; but outside of Spain, this order is better known under the title of the REFORMED FRANCISCANS, who were established in France under Henry IV. and Louis XIV., and spread thence into Belgium, their houses in these countries and Germany becoming so numerous that they reckoned no less than ten provinces. A reform of the Cistercian order of nuns in Spain was called by the same name.

RECO'NNAISSANCE, RECONNOI'TRE, the noun and verb expressive of the operation of inspecting a country in which military operations are intended. This duty devolves on the department of the Quarter-master General, and requires the exercise of qualities of a very high order. The officer deputed to reconnoitre is well mounted, and accompanied by a small escort, also well mounted, in order to escape if noticed by the enemy. His duty is to measure every natural feature in his district by eye, or by more accurate measurement when practicable, and to produce a map, shewing hills, valleys, streams, canals, plains, woods, &c. He must at the same time note all obstacles; what resources the country possesses to maintain men or horses; what the disposition of the inhabitants, &c. Reconnoitring is necessarily a very dangerous service; an officer so employed has often to resort to disguises, and if taken, runs some risk of being treated as a spy.—A maritime reconnaissance is analogous.

RE'CORD, as a legal term, is used in the United Kingdom to signify the formal statements or pleadings of parties in a litigation. In general, the rule is well settled that the pleadings which make up the record do not enter into details of the evidence, but merely set forth the conclusions or inferences, leaving the details of evidence to be supplied at the trial before a jury, or, if there is no jury, at the hearing before the judge or court. All the higher courts file the records in the suits, and are called Courts of Record, and one of the incidents of a Court of Record is, that the court or judge can commit for contempt any person who insults the court, or wilfully obstructs the business. A trial by record means that one of the parties has set up some former decision of the court, while the other denies that such a decision ever existed; whereupon, the only mode of solving the question is by producing the record of the former action, and so settling the dispute. In the Courts of Common Law of England, the parties, by the rules of pleading, come to an issue at last, after mutually answering each other, and the issue is either some short point of fact or of law. No intervention of the judge or court is necessary to come to an issue. In Scotland, however, the closing of the record is a formal step which requires the sanction of the judge, who closes the record after each party has said all he wishes to say by way of statement and answer. See also REGISTRATION.

RECORDS, PUBLIC (Lat. *recordari*, to remember), contemporary authenticated statements of the proceedings of the legislature, and the judgments of those higher courts of law which are distinguished as Courts of Record. It has been a subject of much discussion what constitutes a record, and in a looser sense the term record has sometimes been applied to any public document preserved in a recognised repository. No country is so rich in public records as England. A committee of the House of Commons, in 1837, described the public records of England as comprised under four classes. 1. Independent series of records of territorial surveys at different periods. 2. Series of enrolments, comprising on one roll varieties of distinct entries, classed together according to their formal character. 3. Records of judicial proceedings. 4. Separate documents, as letters, inquisitions, commissions, and privy seals. Act 1 and 2 Vict. c. 94, sets at rest the question what is legally to be held a record, by providing that the word records shall be taken to mean all rolls, records, writs, books, proceedings, decrees, bills, warrants, accounts, papers and documents whatsoever belonging to Her Majesty, or then deposited, or which ought to be deposited, in any of certain places of custody, which are enumerated.

The oldest existing English records are Tallies in Exchequer, which, down to 1834, continued to be used both for receipts and for simple records of matters of account. They consist of wooden rods, marked on one side with notches, to indicate the sum for which the tally was an acknowledgment; while on the two other sides were written the amount, the name of the payer, and the date of the transaction; and the tally being divided longitudinally, the one half was preserved in Exchequer, and the other given to the person who had paid the money. This rude contrivance, which came down to us from Anglo-Saxon times, was an effectual safeguard against forgery. Parchment is the material on which the greater portion of the records are written; the skins being, in some cases, as in the rolls of the Exchequer and common law courts, attached at the top bookways; in other cases, as the Chancery and Wardrobe, sewed consecutively. Some records are in the form of books, as *Domesday*; others are filed—i. e., each document is pierced with a string or gut passed through it, the whole being fastened together in bundles. A few records are written on paper. The early parliamentary records and statutes are principally in Norman-French, which continued in partial use till the time of Henry V.; all the other great series of records, except those of parliament, are in Latin down to the reign of George II., or later, except during the Commonwealth, when English was substituted.

Public records, which can be traced in germ before the Conquest, gradually expanded under the Norman and Plantagenet kings. They enabled the subject to defend and maintain those feudal rights and privileges which were gradually trenching on royal prerogative, and to protect himself from arbitrary exactions; while to the king they furnished precedents which could not be questioned for his calls of military service and taxation.

The various courts being the king's courts, and following the sovereign from place to place, their earliest receptacles were the royal palaces in different parts of England; but when the higher courts were permanently established at Westminster, 'treasuries,' or places of custody for the records of the different courts, were appointed there. A portion of the public records were, as far back as Henry III.'s reign, deposited in the Tower of London and New Temple; and in the reign of Edward III. the Tower had become a permanent treasury. The parliamentary committee of 1837 enumerated among the places of deposit a room in the Tower over a gunpowder magazine, and contiguous to a steam-engine in daily operation; a chapel at the Rolls, where divine service was performed; underground vaults at Somerset House; damp and dark cellars at Westminster Hall; the stables of the late Carlton Ride; and the Chapter-house, Westminster. From the reign of Edward II. downwards, the attention of parliament had often been called to the safe custody and arrangement of the records as an object of solicitude. The fullest examination in recent times was made by a committee of the House of Commons in 1800, whose Report presents far the most comprehensive account of the records in existence. A commission was appointed to go on with the work which the committee had begun, and renewed six times between 1800 and 1831. All the several record commissions directed the commissioners to cause the records to be methodised, regulated and digested, bound and secured, and to have calendars made, and original papers printed; and numerous valuable publications have been issued by the commissioners from time to time. A full investigation into the proceedings of the Record Commissioners was made by a committee of the House of Commons in 1835, since which time annual Reports have been issued by the deputy-keeper of records. The most important recent statute regarding the custody and preservation of the records is 1 and 2 Vict. c. 49, which restores to the Master of the Rolls that custody of the records which he had originally possessed, but which had for a long time become nominal. That officer is empowered to appoint a deputy-keeper of the records, and in conjunction with the Treasury, to do all that is requisite in the execution of this service. He makes rules for the management of the office, and fixes what fees may be demanded. He allows copies to be made, which, when certified by the deputy and assistant keepers, and authenticated with the seal of the office, are producible as evidence in courts of law. The Home Secretary directs from time to time such of the catalogues, calendars, and indexes, and such of the records as he thinks fit, to be printed, and sold at prices fixed by him. The act 1 and 2 Vict. c. 94 contemplates the consolidation of all the records in the large receptacle near Fetter Lane, into which, under Sir John Romilly, the present Master of the Rolls, they are in process of being collected from their different scattered depositories.

Our limits will not allow us to enumerate more than a very few even of the more important classes of records. One class consists of the various territorial surveys, beginning with *Domesday* (q. v.), and including, among others, the *Rotuli Hundredorum*, *Extenta Manerii*, *Testa de Nevill*, *Pope Nicholas's Taxation*, *Henry VIII.'s Survey*, and the *Survey of the Commonwealth*. Another extensive class belong to the *Exchequer*, including the *Pipe Roll*, or Great Roll of the Exchequer, beginning with the second year of Henry II., containing the yearly accounts of the revenues of the crown, certain and casual; the *Memoranda* and *Originalia* rolls, records of *First-fruits and Tenths*, records of the *Court of Augmentations*, instituted to decide questions regarding possessions belonging to the crown, on the dissolution of the monasteries, and *Placita*, or records of pleadings and judgments. The *Rotuli Curiæ Regis* contain the record of the proceedings in the ancient supreme court of law; and there are numerous classes of records of the proceedings in all the various courts of common law and in the Court of Chancery. The record of *Fines and Recoveries* is an unbroken record of the transfer of lands from 25 Henry II. down to 1833, when this species of conveyance was abolished. The *Charter Rolls* are records of charters, of grants of privileges to religious houses, towns, and corporations, and creations of nobility from 11 Edward II. to Edward IV. The *Patent Rolls* are enrolments of instruments written on open (*patentes*) sheets of parchment, having pendent from them the Great Seal, addressed to the lieges in general. The *Close Rolls* are records of such letters under the Great Seal as were despatched closed or sealed up—royal mandates to particular persons for particular purposes, and not intended for public inspection. The *Liberate Rolls* contain writs issued out of Chancery, ordering the payment of money from the Treasury. The *Fine Rolls* contain accounts of fines paid to the king for licence to alienate lands, freedom from knight-service, passing or renewal of charters, wardships, safe-conduct, pardons, &c. The *French Rolls*, *Norman Rolls*, and *Gascon Rolls* relate to the affairs of France, Normandy, and Gascony, when held by the English; and the *Rotuli Scotiæ* to transactions with Scotland. An important class of the records are those connected with parliament, including *Statute Rolls*, *Parliament Rolls*, *Records of Parliament*, and *Statutes* from 1485 to the present time, with the *Journals of the Lords and Commons* from Henry VIII. to the present time, and the *Writs of Summonses* and returns to parliament.

The *state papers* originally sprung from the Privy Council and Chancery, and include the correspondence of the Privy Council, secretaries of state, and other public departments, with miscellaneous domestic papers from the time of Henry VIII. to George II., a mass of correspondence with foreign powers, and an extensive collection relating to ecclesiastical affairs at and after the Reformation. Since 1855, the State Paper Office has become a part of the Public Record Office, and been placed under the control of the Master of the Rolls. Much has been done in the way of calendaring and arranging the contents of this valuable repository, and nine volumes of calendars of state papers have been issued to the public.

By the regulations established by the Master of the Rolls, 5th July 1858, persons desirous of consulting the public records, including state papers, for a literary purpose, have to apply in writing to the deputy-keeper, stating the objects of their search, which, if necessary, may be more fully explained at a personal interview. If the explanation be satisfactory, a permission is issued to inspect and make extracts without payment of fees.

Scotland.—The public records of Scotland were undoubtedly numerous and multifarious as early as 1282; but the more ancient of them were lost by shipwreck in the reign of Edward I. of England. The control of the records has from very early times been intrusted to the Clerk Register, or Lord Clerk Register, one of the high officers of state, who had a seat in the Scottish parliament, to whom, and his deputies and other officers appointed by him, it was assigned to superintend both their formation and their custody. The earliest records of Scotland were in the inconvenient form of rolls, but in the reign of David II. the practice was introduced of

writing them in books. By an act of 1463, the king's rolls and registers were appointed to be put in books; but the accounts in the Exchequer continued, nevertheless, to be kept in rolls till the passing of another act in 1672, appointing them to be written in books. Prior to the reign of Charles II., the public records were deposited, under care of the Clerk Register, in the Laigh Parliament House, now part of the Advocates' Library; and shortly before the Union, the whole records were transferred to that depository, where they continued till the erection of the large building called the General Register House, which was completed in 1787, and has recently been added to. The Register House serves the purpose of preserving and making available the national muniments, as well as accommodating the whole offices of record connected with the supreme court. The Lord Clerk Register and his depute have now merely the *custody* of the records, their preparation being intrusted to another class of officers.

Under the Scottish records are included the acts of parliament and of Privy Council, and the records of all the various courts of justice; also the records of the Great Seal, Privy Seal, and Signet. An important class of records are the *Retours of Services*. A service is by the law of Scotland necessary to transmit a right to real property to the heir from his ancestor. At present, this service consists of the decision of the sheriff of the county or the sheriff of Chancery; but the form in use till 1847 was by retour, a writing which contained the verdict of a jury returned in answer to a brieve from Chancery for finding the heir at the death of his ancestor. The register of retours is not extant further back than 1547.

The registers connected with the transmission of heritable rights are even more important. After several unsuccessful attempts to introduce a system of registration, the great branch of the public records known as the *Register of Sasines* was established by act 1617, c. 16. By the system then introduced, which has since been continued with modifications in detail, all instruments requisite to the transmission of real property must be put on record for publication. Besides the principal register in Edinburgh, there are district registers, and any instrument may be recorded either in the general or district register. Volumes are issued from the General Register House to the district recorders of sasines, which, when filled, are returned to the General Register House. By this means the title to real property can be ascertained with certainty and precision, and may, if necessary, be traced back two centuries and a half. It is also obligatory to record in separate registers all instruments necessary for the constitution, transmission, and extinction of voluntary encumbrances. See REGISTRATION OF DEEDS AND WRITS. This system, while confirming the credit of the proprietor, also operates in favour of the security of creditors. There is a special *Register of Entails*, in which, in terms of act 1685, c. 22, deeds of entail must be recorded at the sight of the Court of Session.

The object of registration in all these cases is *publication;* but charters by subjects, dispositions, bonds, contracts, and other probative writs may, under act 1696, c. 4, be recorded in the *Register of Deeds for preservation.* A third object of registration is *execution.* Every deed constituting a personal claim of debt, or an obligation to perform some lawful prestation, if intended to be made the subject of personal diligence for payment or performance, must be registered previously to execution being issued on it.

Ireland.—Many of the records perished during the wars prior to the final reduction of Ireland, and those which survived these commotions were long exposed to mutilation and destruction from the unsatisfactory arrangements for their custody. A commission was appointed in 1810 for the preservation and arrangement of the Irish records, whose labours, conducted with considerable success, were terminated by the revocation of the commission in 1830. In 1847, commissioners were again appointed to investigate the state of the records, in consequence of whose labours a bill for their safe custody was prepared, but afterwards abandoned. There is no general place of custody for the records of Ireland, which are scattered in different repositories in Dublin. Several volumes of calendars from the Irish *patent* and *close* rolls have lately been published under the direction of the Master of the Rolls, but they are not considered to be so satisfactorily edited as the English record publications.

RECORDE, ROBERT, generally allowed to have been the greatest English mathematician of the 16th c., but now almost forgotten, was born about 1500 at Tenby, in Pembrokeshire, Wales. He completed his education at Oxford, and there distinguished himself in mathematics, rhetoric, music, and anatomy; but wishing to make medicine his profession, he removed to Cambridge, and there, in 1545, he received the degree of M.D., 'being much admired by all who knew him for his profound and varied knowledge of art and science.' In 1547, he was in London, engaged in the composition of *The Urinal of Physic* (1548), a work which saw five editions; and was about the same time appointed family physician to Edward VI. and afterwards to Queen Mary. Ten years after this, we find him in the debtors' prison in London, where he died miserably in 1558. His works are all in the form of dialogues between a master and his pupil, and are written in the rude English of his time; they are—*The Gate of Knowledge*, and *The Treasure of Knowledge*, two works which seem to be completely lost; *The Ground of Arts, teaching the Perfect Work and Practice of Arithmetic*, &c. (Lond. 1549), an arithmetical work which has been frequently reprinted, and which exhibits a curious 'melange' of the Arabic and Roman notation; *The Pathway to Knowledge* (Lond. 1551), an abridgment of Euclid's *Elements; The Castle of Knowledge, containing the Explication of the Sphere both Celestial and Material*, &c. (Lond. 1551), an astronomical work, dedicated to Queen Mary, in which he compares the Ptolemaic and Copernican systems, and, but with great hesitation, gives the preference to the latter; *The Whetstone of Wit, which is the second part of Arithmetic*, a treatise upon algebra, a subject at that time little known, in which R. collects the substance of the best continental writers, and adds his own improvements and discoveries. In the appreciation of the general results derivable from algebraic formulæ, he is far beyond his contemporaries, with the sole exception of Vieta (q. v.). R. is regarded as the inventor of the symbol (=) for equality, and of the mode of extracting the square root of compound quantities. R.'s talents seem to have been as varied as profound, for, besides his mathematical pre-eminence, he was considered to be a skilful doctor, an able lawyer, and a philologist of no mean ability.

RECO'RDER is a judge of a city or borough Court of Quarter Sessions, being a barrister of not less than five years' standing. He is appointed by the Home Secretary, and the salary is paid by the city or borough out of the borough fund. His duties are the same as what are usually discharged by Courts of Quarter Sessions, and are confined

chiefly to the trial of prisoners who have been committed by justices of the peace for trial during each quarter of a year. The recorder is not prohibited from practising at the bar, and he is almost invariably a counsel in active practice. The salary is generally small, but, nevertheless, the office is in great request among members of the English bar. There is no such office in Scotland, but the sheriff discharges similar duties.

RECORDER, the name of a musical instrument formerly in use in this country, somewhat like a flageolet, but with the lower part wider than the upper, and a mouthpiece resembling the beak of a bird. Its pitch was an octave higher than the flute, and it had a pleasing tone, hence Milton speaks of

The Dorian mood
Of flutes and soft recorders.

RECOVERY, in English law, was a term much used in reference to estates tail, though it is also a general term denoting the decision of a court in favour of a party claiming lands or goods. A feigned recovery was an imitation of a similar proceeding, and was a device invented to break an English entail. An estate tail was an estate given to A and the heirs of his body, and at first it was enacted by a statute *De Donis*, under Edward I., that A could not sell or alienate the estate, so as to prevent the heirs of his body acquiring the benefit of it. But the lawyers invented a sham action and judgment, called a recovery, by which the issue were barred from all rights. The Fines and Recoveries Act abolished that form, and substituted for it a disentailing deed, which, when executed by the tenant in tail, has the same effect.

RECRUITING. Formerly, the task of raising recruits for the army was intrusted to the colonels of regiments, who employed civilian agents and others to persuade young men to join their standards; these agents often resorting to very illegal methods to entrap recruits. Subsequently, the duty was assigned to several recruiting corps, each known by the name of its commanding officer; but under this system, so many irregularities, and such difference of practice arose, that in 1802, for purposes of uniformity, economy, and proper control, it was decided to place the whole recruiting under the immediate direction of the adjutant-general. For this purpose, the country was divided into recruiting districts. At the head of each district was placed an inspecting field-officer, with the duty of superintending all recruiting parties in his district, and of approving the recruits brought. At some of the principal places in the district, superintending officers are stationed to overlook the recruiting parties. At the district headquarters, there is a paymaster, responsible for all the financial concerns, and a medical officer, who examines the recruits in point of health and physical fitness. This system still obtains, though the number of districts has been greatly reduced from the original number. At present, Great Britain is divided into five recruiting districts, having their headquarters respectively at Leeds, Liverpool, Bristol, London, and Glasgow. In Ireland, there are three districts; headquarters, Belfast, Dublin, and Cork. The total cost for the year 1864—1865 is £21,724 for these establishments, exclusive of £80,747 for levy-money, transport, &c., of recruits. Staff-officers and serjeants of the Pensioner Force are also occasionally entrusted with the obtaining of recruits.

Recruiting parties consist of old sergeants, who seek by every means to induce young men to enter the army; they frequent fairs, wakes, and country gatherings, endeavouring by beat of drum, smart uniforms, well-fed personal appearance, and persuasion—not always too truthful—to convince the rustics of the advantages of the Queen's service; advantages which really exist, though not always to the extent depicted. On a would-be recruit presenting himself, the sergeant must ask him if he already belong to the militia; if not, and he appear physically eligible, the sergeant gives him a shilling, after which, should he abscond, he becomes a deserter. The sergeant must then give the recruit 24 hours for consideration; afterwards, but within 96 hours from first enlistment, he must take him before a magistrate, when, if the recruit declare that he voluntarily enlists, the justice reads to him the articles of war relative to desertion, and puts the questions detailed in the attestation. This done, the oath of allegiance is administered, and the man becomes definitively a soldier, receiving his free kit and bounty. The recruit may avow his dissent before the magistrate, when he must be forthwith discharged on returning the shilling, and paying twenty shillings as 'smart' for the trouble he has given. False declarations as to age, previous service, health, &c., involve the recruit in various penalties. About 12,000 recruits are raised annually in time of peace for the British army.

Recruiting for the navy is treated under MANNING THE NAVY.

RECTIFYING is a process applied to alcohol after its distillation, to remove certain impurities which come over with it from the still. These, in part, consist of essential oils; and in order to effect their removal, caustic potash is added in sufficient proportion to saponify the oil present; water is also contained in the first distillation, and to remove this, and to assist in removing the oily matters, common pearl-ash is added. Technically, the former of these is called *gray salts*, and the latter, *white salts*; and about four pounds of each are added to every 700 gallons of spirit, and well agitated, so as to combine with the oil and water. The spirit is then distilled again, and comes over much more pure, the alkaline salts, and the matters which have been combined with them, being left behind in the still. This is usually repeated two or three times, the quantity of the salts being diminished to one-half in the second, and proportionately decreased in the succeeding distillations. The rectifier is not only a purifier of the alcohol produced by the distiller, but he often gives it a distinctive character; by adding flavouring materials to it, he makes it into gin, brandy, &c. Thus, in order to convert the spirit into London gin, juniper berries and coriander seeds are added previous to the last rectification. Œnanthic ether and other things give the flavour of brandy. This part of the operation is very much varied by the taste and skill of the rectifier.

RECTOR (Lat. *rector*, a ruler), the title of several classes of clerical and collegiate officials, some of which are referred to under their respective heads. As regards clerical rectors, the title, in its most ordinary English use, is applied to the clergyman who holds complete and independent charge of a parish. This use, however, is a departure from the canonical signification of the title, which meant rather a clergyman who was appointed to govern a parish where the chief parochial jurisdiction was vested in a religious corporation or in some non-resident dignitary. In certain of the monastic orders, the name rector is given to the heads of convents, as it is also given to the heads of universities, colleges, seminaries, and similar educational corporate institutions.

RECTUM, DISEASES OF. The terminal portion of the intestinal canal, named, from its comparatively

straight course, the rectum, is the seat of various affections requiring medical or surgical assistance. Some of these affections, as piles, prolapsus ani, and hæmorrhage from the rectum, have already been considered. Amongst the other diseases of the rectum of sufficient importance to claim notice in these pages are—

1. *Stricture of the Rectum,* which may be either spasmodic or permanent. *Spasmodic stricture* is comparatively rare. *Permanent stricture* may be either of a simple or malignant nature. *Simple stricture* consists in a thickening and induration of the mucous coat of the rectum, so as to form a ring encroaching on the calibre of the tube. It is situated about two or three inches from the anus, and the contraction is so great and unyielding that it is often difficult to pass a finger through it. The symptoms are constipation and great pain, and a straining in evacuating the fæces, which are passed in a narrow, flattened, or worm-like form, which is very significant of the nature of the case. In an advanced stage of the disease, diarrhœa and prolapsus often supervene. However great may be the constipation, strong irritant purgatives must be altogether avoided. Soft and unirritating evacuations must be procured by such medicines as the confection of senna combined with sulphur (see PILES), or injections of castor-oil or of tepid water. The diet should be regulated so as to assist the action of the medicines. Nutritious soups are serviceable, since, at the same time, they support the strength and leave little matter to be excreted. When much local irritation is present, it may be relieved by the hip-bath and by sedative injections; till it is subdued, surgical interference would do more harm than good. A bougie capable of being passed with moderate pressure through the stricture, should be inserted in the gut every third or fourth day, and should be allowed to remain for about a quarter of an hour; and its size should be gradually increased. Nothing is gained by the forcible passage of large bougies. The cure is to be effected by pressure so applied as to produce absorption, not by mere mechanical dilatation. *Malignant stricture*—most commonly due to the scirrhous, but sometimes to the epithelial form of cancer—is by no means a very rare affection, and is more common in the female than the male sex. Until ulceration sets in, the symptoms are like those of simple stricture, only exaggerated in degree; but afterwards there is a discharge of fetid muco-purulent matter streaked with blood. In this disease, the treatment can be only palliative, unless the surgeon resort to the formation of an artificial anus in the loins as a last resource.

2. *Spasm* of the *sphincter ani* muscle is characterised by extreme pain in the region of the anus, especially when an attempt is made to evacuate the bowels. The muscle contracts so firmly that the surgeon cannot easily introduce the finger into the rectum. The spasm may be caused by piles, by fissure of the anus, by ulceration of the rectum, and sometimes apparently by mere constipation. It is often relieved by the application of the Belladonna Ointment of the British Pharmacopœia.

3. *Neuralgia of the rectum,* known also as *proctalgia,* is a common disorder, and is especially prone to attack children and gouty persons. It is usually relieved by the judicious use of aperient medicines.

4. *Congestion,* sometimes proceeding to *inflammation,* is not uncommon in the rectum. The congestion occasions a sense of weight and fulness in and about the rectum, together with a variety of other symptoms. Amongst the causes of this affection are stone in the bladder, stricture of the urethra, an enlarged prostate gland, the presence of thread-worms, the abuse of irritating purgatives, exposure to cold draughts in the water-closet, &c.; and there can be no doubt that sedentary habits strongly favour the predisposition to this affection. The great object of treatment is to relieve the overloaded vessels of the rectum. The bowels should be freely opened with castor-oil, leeches should be applied to the verge of the anus, and after their removal a warm hip-bath is advisable.

5. *Pruritus podicis,* or *itching of the anus,* is a very common and extremely troublesome affection. Sometimes it depends on the presence of thread-worms or of old piles, while in other cases it is one of the manifestations of the skin-disease known as *Prurigo* (q. v.). The treatment must depend upon the exciting cause.

6. *Fissure of the anus* is a small crack which gives intense pain during the passage of the fæces, and often persisting for several hours. Free purgatives, and the application of astringent lotions or ointments (as tannin lotion or ointment of galls) should be tried; and if they fail, partial division of the sphincter muscle must be resorted to—an operation easily performed, and certain to give relief.

7. *Fistula in ano* signifies a fistulous or pipe-like track by the side of the *sphincter ani* muscle. It may occur as a *complete fistula,* which has an external opening near the anus, and an internal opening into the bowel; or as a *blind external fistula,* which has no actual opening into the bowel, although it extends to its outer coat; or as a *blind internal fistula,* in which the preceding conditions are reversed. A sketch of the mode of treatment is given in the article FISTULA.

For a detailed description of these diseases of the rectum, and for information on many other less important affections of this part of the body, the reader is referred to Bushe's *Treatise on the Rectum,* and to the more recent works of Mr Ashton and Mr Henry Smith on the same subject.

RECU'SANTS, in English law, are persons who refuse or neglect to attend at the worship of the established church on Sundays and other days appointed for the purpose. The offence as a legal one may be held to date from 1 Elizabeth c. 2; but there were four classes punishable under the statutes against recusancy—simple 'recusants;' 'recusants convict,' who absented themselves after conviction; 'popish recusants,' who absented themselves because of their being Roman Catholics; and 'popish recusants convict,' who absented themselves after conviction. It was against the last two classes that the statutes were mainly directed. In addition to the general penalties of recusancy, the popish recusants, for wilfully hearing mass, forfeited 100 marks (£66, 13s. 4d.); and for saying mass, 200 marks, or £133, 6s. 8d., in addition (in both cases) to a year's imprisonment. They were disabled, unless they renounced popery, from inheriting, purchasing, or otherwise acquiring lands; and they could not keep or teach schools under pain of perpetual imprisonment. Popish recusants convict could not hold any public office; could not keep arms in their houses; could not appear within ten miles of London under penalty of £100; could not travel above five miles from home without license; could not bring any action at law or equity; could not have baptism, marriage, or burial performed, except by an Anglican minister; all under penalties of forfeiture and imprisonment. Protestant dissenting recusants were relieved from the penalties of recusation by the Toleration Act of 1 Will. and Mary, c. 18. Catholics were partially relieved in the year 1791, and completely by the Emancipation Act of 1829.

REDA'N is the simplest work in field-fortification. It consists of two parapets whose faces join in forming a salient angle towards the enemy, like a letter V, in which the apex is to the front. Regarded by itself, the redan is a work of very little strength, since there is no flanking fire to protect its faces, and nothing to prevent an enemy from forcing an entrance at the gorge; but redans are useful in many positions, and the rapidity with which they may be constructed, render them favourites with engineers and generals. A row of redans along an exposed front of an army adds much to its strength, the troops behind protecting the gorge, and the redans flanking each other. It forms an excellent defence for a bridge-head, the gorge being covered by the river. Redans figured largely in Wellington's works for defending Lisbon in 1810. The redan of Sebastopol in 1855 was the principal point of the English attack, and the scene of two bloody repulses by the Russians in June and September.

REDBREAST (*Erythaca rubecula*, or *Sylvia rubecula*), a bird of the family *Sylviadæ*, familiar to every one in the British Islands and throughout most parts of Europe—a universal favourite, from the readiness with which it approaches or enters human habitations, its lively manners, its aspect of pert curiosity, the frequency with which its song is heard in autumn and winter, and the strange mixture of shyness and audacity which its behaviour displays. It is generally known throughout Britain by the endearing name of *Robin Redbreast*, or more briefly *Robin*, and has many similar appellations in continental Europe, significant of the kindly regard entertained for it, which is everywhere such that children early begin to distinguish it from all other birds as their peculiar favourite. Its utmost length is about 5¾ inches, but it is of a rounder and fuller form than many of the *Sylviadæ*, the slenderness of its legs rather strikingly contrasting with the form of the body. The wings are rather short, the fifth quill the longest. The tail is scarcely forked. The bill is rather broad and depressed at the base, narrower and slightly compressed at the point, the upper mandible bent down and notched. The general colour is olive-brown, and the reddish-orange breast is a conspicuous characteristic, particularly of the male. —The R. is a native not only of Europe, but of the western temperate parts of Asia and of the north of Africa. In the most northern parts of Europe it does not appear, and in many northern regions it may be regarded as a bird of passage; but, contrary to the ordinary rule as to birds of passage, it never congregates in flocks; it is always seen either solitary or in pairs. The attachment of pairs seems to extend beyond the mere breeding season, and, indeed, throughout their lives, and to be stronger than in most birds. The breeding season is early in spring. The nest is made of moss, dead leaves, and dried grass, lined with hair, often placed a little above the ground in a bush or among ivy on a wall; the eggs five to seven in number, white, spotted with pale reddish-brown; but many are the stories of the curious situations in which the R. has built its nest, in close proximity to houses and workshops, regardless of the presence of human beings, and of the noise of hammers and wheels. In winter, the R. seeks the neighbourhood of human habitations more than in summer, and becomes more bold and familiar. Its food ordinarily consists of worms, insects, and berries; and when it becomes a pensioner at any door or window, which it very readily does, it shews a particular relish for small scraps of meat. Its song is sweet and plaintive, but weak, not much noticed amidst the many voices of summer, but often heard in the quietness of autumn, and even of winter, throughout which it is continued whenever the weather is good.

In America, the name R. is often given to the Blue Bird (q. v.).

RED COLOURS. Those used by painters consist of certain chemical compounds, natural or artificial. Thus, the red pigment called Armenian Bole, is either the ochreous earth known by that name, imported from Armenia, Tuscany, and other places, or else, as is most frequently the case, it is a composition of whiting, red oxide of iron, and red ochre. Vermilion is a sulphuret of mercury produced either naturally or artificially. Chrome-red is made by boiling carbonate of lead with chromate of potash in excess, until it assumes a red colour, after which it is washed in pure water, and dried in the shade. Indian-red is a native product of Persia, being found in the neighbourhood of Ormuz. It is imitated by calcining colcothar with red ochre. Light-red is made by calcining yellow ochre, and this can be converted into flesh-colour by a due admixture of white. A bright orange-red, sometimes called Sandix, is made by calcining white-lead. Minium, or Red Lead, is a very distinct red colour, requiring but little preparation; it is much used. Red ochre is extensively found in the Mendip Hills, and is an oxide of iron; with clay, it forms a brownish-red paint. There are several other red colours, but these are the principal ones employed by painters.

RED CRAG, a deposit of quartzose sand intermixed with rolled and comminuted shells, of a deep ferruginous or ochreous colour, which occurs in Suffolk, and belongs to the Pleiocene strata (q. v.).

RED DEER. See STAG.

RE'DDITCH, a large manufacturing town of Worcestershire, stands on an acclivity 12½ miles south-south-west of Birmingham, with which it is connected by railway. Needles, pins, fish-hooks and fishing-tackle, are made extensively. Pop. (1861) 5571.

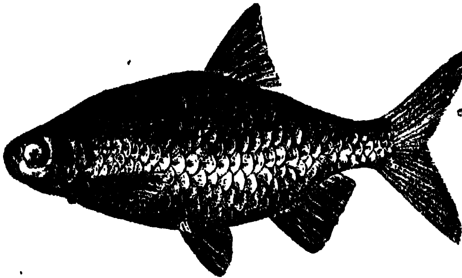
REDDLE, RADDLE, or **RED-CHALK**, an ochrey red-clay iron ore, which is chiefly imported from the continent, where it is found in Hessia, Thuringia, Upper Lusatia, Silesia, and Salzburg. It is found in small quantities in England, in the neighbourhood of Rotherham, and at Wastwater, Cumberland. The English differs somewhat in quality from the foreign, and is chiefly used in polishing spectacle glasses. Of that from abroad, the finest quality is used for drawing on paper; the inferior sorts are used by carpenters and others for marking with; and the commonest is used for marking sheep. It occurs generally in thin beds, in clay-slate.

REDE'MPTION, in Law, the right of redeeming property which has been pledged to secure a debt. The equity of redemption is the name given to this right, and is commonly used in reference to mortgages of real estate, the mortgagor, after executing a deed of mortgage, having a right at any time to pay off the debt, and redeem or get back his property, unless he has been foreclosed by the creditor by a legal proceeding, the object of which is to sell the property to pay the debt. In Scotland, the equity of redemption is more usually called a reversion.

REDE'MPTIONISTS, one of the names of an order of monks devoted to the redemption of Christian captives from slavery. They are more frequently called TRINITARIANS (q. v.).

REDE'MPTORISTS, called also LIGUORIANS, a congregation of priests founded by St Alfonzo Liguori (q. v.).

RED-EYE, or RUDD (*Leuciscus erythrophthalmus*, see LEUCISCUS), a fish of the family *Cyprinidæ*, common in lakes, slow rivers, fens, &c., in many parts of Europe and in England. It much resembles its congener the Roach (q. v.), but is shorter



Red-eye, or Rudd (*Leuciscus erythrophthalmus*).

and deeper. It is a richly-coloured fish. The name Rudd refers to the colour of the fish, the name Red-eye to that of its iris. The R. is better eating than the roach. It is readily caught by a baited hook. It sometimes attains a weight of two lbs.

RED GUM is the popular name for the papulous disease of the skin known to the physician as *strophulus*. It is a florid eruption, usually occurring in infants before or during their first dentition, and appearing on the most exposed parts, as the face, neck, arms, and hands, from whence it sometimes extends to other portions of the body. It occurs in minute red pimples, irregularly arranged, with occasional red patches, and sometimes a few interspersed vesicles. White pimples, popularly known as *white gum*, are also sometimes intermingled with the red papillæ. Strophulus is almost always an acute disease, seldom lasting more than a month. It is almost always an innocent complaint, and often occurs without any marked disturbance of the general health. In severe cases, the pimples cause a sensation of heat and itchiness, especially if the child is kept too warm, and slight febrile symptoms manifest themselves. Amongst the probable causes of this disease are the irritation caused by rough flannel next the skin, want of cleanliness of the skin—especially in relation to the child's excretions—the general disturbance of the system excited by teething, &c. Very little is required in the way of treatment further than to remove any obvious cause of the affection. Cold applications should be carefully avoided, lest they should translate the cutaneous irritation to some important internal organ. In the event of such a translation, the child should be placed in a hot bath, and mustard poultices, or hot moist cloths sprinkled with turpentine, should be applied over the arms and chest.

RED HAND, in Heraldry. A sinister hand erect, open, and couped or, the wrist gules, being the arms of the province of Ulster, was granted to the baronets of England and of Ireland as their distinguishing badge, on the institution of that order in 1611, and is borne by the baronets of Great Britain and of the United Kingdom. It is assumed into the armorial coat, and may be borne upon a canton, or on an escutcheon, which may be placed either in the middle chief or in the fess point, so as least to interfere with the charges composing the family arms.

RED-HOT SHOT are cannon-balls heated to redness, and fired from cannon at shipping, magazines, wooden buildings, &c., to combine destruction by fire with battering by concussion. In modern warfare, shells containing molten iron are intended to be used in lieu of red-hot shot; but they have not yet been tested in actual practice, although a similar device was attempted unsuccessfully in 1863 by the Federals in besieging Charleston.

REDING, ALOYS VON, the famous champion of Swiss independence, was born in 1755, in the canton of Schwyz. After serving in Spain, he returned to Switzerland in 1788. As captain-general of the canton of Schwyz, he repulsed the French Republicans, May 2, 1798, at Morgarten. After the formation of the Helvetic Republic, R. was one of those who eagerly worked for the restitution of the old federal constitution. In 1802, he founded in the eastern parts of Switzerland a league, with the intention of overthrowing the central government. When, after the departure of the French, almost all the cantons declared themselves against the Helvetic government, R. called a general diet at Schwyz, which assembled September 27, 1802, and occupied itself with the formation of a new independent constitution. R. went to Paris, in order to win over the First Consul to the proposed change. In spite of all his endeavours, however, he failed to succeed. The disarmament of the Swiss by a French army, and the acceptance of the act of mediation, put an end to his hopes and to his political activity. In 1803, he officiated still as Landamman, or chief magistrate, of Schwyz; but after that retired into private life till 1809, when he was invested once more with the same dignity. In 1813, R. conducted the negotiations with the allies in regard to the neutrality of Switzerland. He died in February 1818, leaving the character of an honest man, whose political career might have been more successful, had he not been wanting in firmness of mind and of character.

RED-LIQUOR, a chemical compound much used by dyers. It is a crude acetate of alumina, and is commonly prepared in dyeing establishments by dissolving a quantity of alum in boiling water, and separately dissolving, also in hot water, three-fourths as much acetate of lead. The two solutions are next mingled together; and after settling, the clear fluid, which is the red-liquor, is poured off. The sediment is sulphate of lead.

REDOU'BT is a small fort of varying shape, constructed for a temporary purpose, and usually without flanking defences. The term is vague in its acceptation, being applied equally to detached posts and to a strong position within another fortress. Redoubts as a general rule do not exceed 40 yards square, with 4 guns and a garrison of 320 men. Redoubts are made square, pentagonal, and even circular. Each redoubt has parapet, ditch, scarps, banquette, &c., as in regular fortification; but it is commonly rather roughly constructed, haste and unprofessional labour precluding mathematical accuracy. The entrance may be by a cutting through the parapet, as at *a*, in fig. 1, the cutting being covered within by a traverse; or, preferably, by an excavated gallery leading into the ditch, and thence by a ramp through the counterscarp. For the sake of flanking the ditch, and preventing an assaulting party from forming in it, caponnières of timber, loopholed, are sometimes formed, as at *b*; or, if the soil be stiff or chalky, a gallery may be cut behind the counterscarp, and loopholed towards the ditch. In some modern redoubts, the line of

each side is broken to afford flanking defence, as in fig. 2. Redoubts have the weak feature of

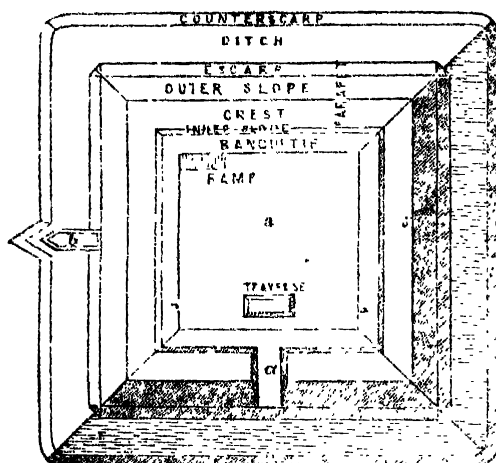


Fig. 1.

not defending their own ditches, and of being approached at their salient angles with comparative impunity. They are therefore not adapted to a protracted defence, but as temporary field works, or in a war of posts, they are often of incalculable importance. Troops whose stability in the open field is doubtful, are especially strengthened by redoubts in their line. Redoubts are particularly useful in fortifying the tops of hills, or commanding passes, or where the object is to occupy a hostile territory, or to feel the way gradually through a wooded country.

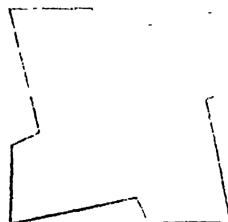


Fig. 2.

REDOUT KALÉ, a flourishing, fortified seaport of Russia in Trans-Caucasia, stands on the eastern shore of the Black Sea, 10 miles north of Poti. It is the port of Tiflis (q. v.), carries on a considerable trade, and has regular steam-boat communication with Trebisond, Smyrna, Constantinople, and Marseille. Its chief articles of import are cotton, silk, and woollen stuffs; sugar-cane, wine, spices, and hardwares. The principal exports are raw silk, wax, wool, skins, caviare, and timber. The quantity of silk exported is 10,000 puds (value £68,000) a year. All the other exports taken together do not amount to more than £12,000 a year. During the Crimean War, the Russian garrison at R. K., finding the fort invested by Sir Edmund Lyons with several men-of-war, set fire to the town, 19th May 1854. It has since, however, been rebuilt and strengthened. Population inconsiderable, though increasing.

REDPOLE. See LINNET.

RED RIVER, the lowest western branch of the Mississippi, rises on the eastern border of New Mexico, flows eastward, separating Texas from the Indian territory, thence south-east through Louisiana, and enters the Mississippi 341 miles from its mouth. It is 2100 miles long, and receives numerous branches, the Washita, Negro, Big and Little Wichita, &c. Near its source, the south branch runs for 60 miles between perpendicular banks, 600 to 800 feet high. It is navigable for 8 months of the year to Shreveport. Thirty miles above this place is the Great Red River raft, formed of drift-wood, which blocks up the river for 60 or 70 miles. Its other important towns are Alexandria and Natchitoches.

RED RIVER OF THE NORTH rises in a cluster of lakes in Western Minnesota, U.S., near the sources of the Mississippi, and runs north, separating Minnesota from Dacotah, into the British possessions, and empties in Lake Winipeg, about 500 miles from its source, watering a beautiful country, and receiving numerous branches, the chief of which are the Cheyenne, the Pembina, and the Assiniboine.

RED RIVER SETTLEMENT, a small colony in North America, directly dependent on Britain, is situated along the course of the Red River (q. v.). It lies within the territories comprised in the charter granted to the Hudson's Bay Company, and was purchased from them by the Earl of Selkirk in 1811, for the purpose of planting a colony. In the deed of transfer, its boundary-line is defined to 'begin at a point on the western shore of Lake Winipeg in 52° 30′ N. lat.; thence running due west to Lake Winipegoos; thence in a southerly direction, so as to strike its western shore in lat. 52° N.; thence due west to the intersection of the parallel of 52° N. lat. and the Assiniboine River; then due south to the height which separates the waters of Hudson's Bay from those of the Missouri and Mississippi; thence east along that height to the source of the Winipeg, or the principal branch of the waters which flow to the mouth of the Winipeg River; thence in a northerly direction to the middle of Lake Winipeg, and thence west to the place of beginning.' This boundary was, however, curtailed some time afterwards, by the claim of the United States to all the land south of lat. 49° N. The western portion is one level plain, bleak and monotonous, with a few shrubs or bushes scattered here and there, and devoid to a great extent of irrigating streams; while the eastern side presents a varied landscape of hill and dale, the latter low, level, and marshy, and both well wooded. The winters are long, dreary, and excessively cold, the thermometer sometimes reaching − 45° F., rising in summer to 95° or 105° in the shade. The climate is nevertheless very healthy, the only prevalent diseases being those which are induced by sudden changes of temperature. The land under cultivation is extremely productive, and the natural pasture in summer affords splendid facilities for the breeding of horses, sheep, and cattle. A number of the colonists are buffalo hunters, and others resort to the lakes Winipeg and Manetobah, where they gain a subsistence by fishing in these inexhaustible waters. The first settlers were emigrants from the north of Scotland, who spoke Gaelic, and professed Presbyterianism. They were joined by 100 Canadian veterans and a fresh colony of Scotch in 1815; and subsequently by French Canadians, French-Indian and English-Indian half-breeds from the territory of the North-west Company, and a few immigrants of other nations. The colonists were on several occasions brought almost to the verge of ruin from the attacks of the North-west Company, the extreme severity of winter, inundations by the swollen waters of the Red River, a visitation of grasshoppers; they are now, however, enjoying a reasonable share of prosperity. The population in 1857 was 6522, of whom the Canadians and Scotch are chiefly agriculturists, and the half-breeds hunters, fishers, &c. Horse-breeding is extensively carried on, and the produce are in considerable demand;

but the settlement has very little import and export trade, the latter consisting chiefly of flour, which is purchased at a fair rate by the Hudson's Bay Company. The amount of land under cultivation in 1849 was 6400 acres; and there were 2085 horses, 6014 cattle, 3096 sheep, and 1565 pigs; while the number of flour-mills was 20—18 driven by wind, and 2 by water. To supply the spiritual and educational wants of the colonists, there were 7 churches of various denominations, and 12 schools. The administration is exclusively in the hands of a governor (appointed by the crown), who refers to headquarters for instructions in extraordinary cases. For the geological features of the district, see Dr Hector's Reports in the *Journal of the Royal Geographical Society*, 1860.

RED ROOT (*Ceanothus*), a genus of plants of the natural order *Rhamnaceæ*, consisting of deciduous shrubs with simple alternate leaves and large red roots, whence their common name. The common RED ROOT of North America (*C. Americanus*), which abounds from Canada to Florida, is a shrub of 2—4 feet high, with beautiful thyrsi of numerous small white flowers. It is sometimes called *New Jersey Tea*, because an infusion of the dried leaves is occasionally used as tea, and was so especially during the American War of Independence. The plant is also used for dyeing wool of a cinnamon colour. A strong infusion of the leaves has been found useful in aphthous affections, in the sore throat of scarlet fever, and in dysentery.—A number of species are found in different parts of North America, some of them very beautiful, especially *C. azureus*, a Mexican shrub, with elongated thyrsi of brilliant blue flowers. Some of the species grow very well in Britain; the Mexican ones require protection from frost in winter.

RE'DRUTH, a town of Cornwall, consists chiefly of one long street, which stands on a hill, in the centre of a famous mining district, 9½ miles north-west of Falmouth. Iron foundries are in operation; but the principal product of this vast mining district is copper. In the vicinity are many mines, which are worked by large steam-engines. By railway, there is easy communication to St Ives and Falmouth Bays. Pop. (1861) 7919.

RED SANDSTONE was the term formerly applied to the combined Devonian and Permian rocks, when their relations to the Carboniferous strata were unknown. The discovery that one set of the red sandstone was below the coal, while the other was above it, caused their division into the Old Red (q. v.), or Devonian, and the New Red, or Permian (q. v.). For some time after this division, the original term Red Sandstone was retained by a few geologists to characterise the newer set of red rocks, but it is now quite given up.

RED SEA, or **ARABIAN GULF**, an inlet of the Indian Ocean, in form a long and narrow gulf, stretching north-west from the Strait of Bab-el-Mandeb (lat. 12° 40′ N.), by which it communicates with the Gulf of Aden, to the Isthmus of Suez (lat. 30° N.), which parts it from the Mediterranean Sea. It separates Arabia on the east from Egypt, Nubia, and Abyssinia on the west. Its extreme length is over 1400 English miles; it varies greatly in breadth—from about 20 miles at the Strait of Bab-el-Mandeb, to upwards of 230 at about lat. 16° 30′. At Râs (Cape) Mohammed (lat. 27° 40′ N.), the sea is parted into two arms or smaller gulfs, which enclose between them the peninsula of Mount Sinai; that on the west, continuing the direction of the main body of the sea, is the Gulf of Suez (Bahr-es-Suweis), of which the Strait of Jubal or Jublah forms the entrance; its length is about 180 miles; extreme breadth (about lat. 29°), upwards of 30. The eastern arm, called the Gulf of Akabah (Bahr-el-'Akabah), is entered by the Strait of Tirân, and runs north-north-east to lat. 29° 30′ N. Its length is upwards of 100 miles; greatest breadth, rather more than 15. The depth of the R. S. varies considerably, but is in many places very great; the deepest sounding is marked as 1054 fathoms, in lat. 22° 30′. Southward of 16°, it is comparatively shallow; but the shallowest part of the whole Sea is the Gulf of Suez, which decreases in depth from 40 or 50 fathoms at the entrance to 3 fathoms in Suez Harbour, at the northern end, where the Gulf, which is supposed in ancient times to have extended considerably further north, has apparently been filled up by the sand washed up by the strong tides, or drifted in by the winds. The Gulf of Akabah is much deeper; it is, in fact, a narrow, deep ravine, with steep and rocky sides, forming the termination of the long valley of the Arabah, running northward to the Dead Sea. The basin of the R. S. itself is the lowest portion of a deep valley lying between the highlands of Africa on the west, and the lofty plateau of the Arabian hills on the east, which latter, rising at some little distance inland, leave for the most part a sandy and sterile tract along the sea. The navigation of the R. S. has always been accounted difficult and dangerous, owing to the prevalence of violent winds, and the number of islands, shoals, and coral reefs, which line the shores. These coral reefs extend generally in parallel lines along the coast they abound in all parts, but are especially frequent on the Arabian side, where the navigation is consequently very intricate. The coral is very beautiful, often red or reddish in colour, but more commonly white. The islands generally occur singly, but between the parallels of lat. 15° and 17°, they are found massed in two groups—the Farsan (q. v.) Islands on the eastern, and the Dhalac (q. v.) Islands on the western side. In mid-channel, south of Râs Mohammed, there is generally a width of 100 miles clear. Along this channel, the winds are constant throughout the year in one of two directions: from May to October, the north-west monsoon blows; for the rest of the year, the south-east is the prevailing wind, and the water in the northern part of the Sea is then raised to a higher level than the Mediterranean. It had been generally supposed that the level of the R. S. was more than 30 feet higher than that of the Mediterranean, but it is now known, from careful observations, that the levels of the two seas are really the same. The principal ports are, on the Arabian side, Mocha, Jeddah (the port of Mecca), and Yembo (the port of Medinah); on the west, Suez, Cosseir, Suakin, and Massowah. The origin of the name R. S. has given rise to a variety of conjectures, and has never yet been satisfactorily settled. It is supposed to have been so called from the name Edom (Red), as the mountains of that country are washed by the waters of the Gulf of Akabah; from the red and purple colouring of the rocks which in some parts border it; from the red colour sometimes given to the waters by animalcules and sea-weed; or from the reddish tinge imparted to them in some places by the subjacent red sandstone and reddish coral reefs. To the Hebrews, it was known as *Yam Sûph*, the sea of *weeds* or *sedge*. By the Greeks, in the earliest times, the name R. S. was given to the whole of the Indian Ocean, including both the R. S. and the Persian Gulf, and not distinctively to the former (which was then and afterwards known as the Arabian Gulf), though the name, in

later times, gradually became restricted in its application.

From the earliest times, the R. S. has been a great highway of commerce between India and the Mediterranean lands, and traversed successively by Egyptians, Phœnicians, Hebrews, and Arabs. It is first mentioned in the Book of Exodus, on occasion of the passage of the Israelites, which is supposed to have taken place a little south of the present town of Suez. The first recorded navigation of the Sea was in the time of Sesostris, in the 14th c. B.C. Three centuries later, Hebrew and Phœnician ships traversed the R. S. on the voyage to Ophir, from the port of Ezion-geber, at the head of the Gulf of Akabah. The Gulf of Suez was for many centuries apparently the seat of the Egyptian trade in this sea and to India. After the foundation of Alexandria, and during the dynasty of the Ptolemies and the Roman dominion, the trade with India was vigorously carried on, though the chief seat of traffic was moved further southward, to the towns of Berenice and Myos Hormos, which sent out annually large fleets to India. After the establishment of the Mohammedan empire in the 7th c., an important trade with India and China seems to have been carried on through the R. S.; and through it, in the period between the 12th and 15th centuries, the goods of the East passed to the Venetian factories in Alexandria, until the discovery of the route round the Cape of Good Hope diverted the traffic with India into a different channel, and put an end to the commerce of the Red Sea. Since the establishment of the so-called Overland Route to India, the R. S. has more than regained its ancient importance as the highway of commerce between Europe and the East. See SUEZ.

For the classical geography of the R. S., the *Geographi Græci Minores* of Müller (Paris, 1855), and the Atlas appended to it may be consulted. Fuller information on the subject of the R. S., its coasts, and adjacent lands, will be found in the elder Niebuhr's *Travels*, and *Description of Arabia;* in the *Travels* of Salt, Burckhardt, Rüppell, and others; in Wellsted's *Observations on the Coast of Arabia, &c.;* in Ehrenberg's work on the Coral Islands of the R. S.; Ritter's *Erdkunde*, vol. ii.; and the Admiralty Chart, based on the surveys of Moresby, Carless, and others.

REDSHANK. See SANDPIPER.

REDSHID PASHA, a celebrated Turkish statesman, and long the chief of the party of progress in Turkey, was born at Constantinople about 1800. He accompanied his brother-in-law, the governor of the Morea, into Greece, and after his death, obtained the post of chief secretary in one of the government offices at Constantinople. On the outbreak of the Russian war (1828—1829), he was charged with a mission in Bulgaria, and exerted himself effectually to protect the Christian subjects of the Porte from the fanatic rage of their Moslem neighbours; and on his return obtained from Mahmoud, who fully appreciated his character, a post in the foreign office. On the creation of resident representatives at foreign courts, R. was sent to the courts of France and Britain, and applied himself diligently to the study of the language, manners, and political constitution of these countries; but was recalled in 1837, and nominated grand-vizier. His persuasive eloquence and firmness of character greatly aided the sultan in carrying out his plans for the better centralisation of the administration, and for mercantile intercourse with foreign nations; but the old Turkish party were still too strong for him, and he was compelled to resign office, and return to Paris and London to support the Turkish against the Egyptian interests. Recalled by the death of the sultan, and the disaster of Nisib, to his old post, the foreign office, he succeeded, after a debate in council of three days' duration, in obtaining the hattisherif of Gulhane (3d November 1839), a species of constitutional charter, which, from the comparative weakness of its promoters, became a dead letter. The effects of his foreign diplomacy were soon apparent in the humiliation of the Egyptians in Syria; but a seraglio intrigue, which occasioned his dismissal, deprived him of the honour of concluding peace. From 1841 to 1845, he was the Turkish representative at the French court, and though recalled to fill the post of grand-vizier (28th September 1846), he found his influence at court greatly diminished under the new sultan. He was vigorously supported by Sir Stratford Canning, the English ambassador, who was of the opinion that all hopes of a bright future to Turkey depended solely upon Redshid Pasha. He was frequently deposed, and almost immediately recalled, according as the anti-reform party gained or lost the ear of the sultan; but the complications with Russia, which arose in 1853, threw the anti-reformers (who had counselled an obstinate disregard of all the Russian representations) into discredit, and R., more powerful than ever, was again recalled to the direction of foreign affairs. In 1854, he was again overcome by his political opponents, and retired from office, which he did not resume till after the peace of Paris. His reappointment as grand-vizier excited great hopes of further salutary reformations; but the French influence at the Porte was pertinaciously antagonistic, and he was twice forced to resign, and as often recalled. At last, worn out with harassing cares and toil, he was seized with an illness, to which he speedily succumbed, at his palace of Emmirgian, 7th January 1858. Though a Turk, he was one of the most enlightened men of his time, and was well versed in foreign languages, general literature, and science.

RED SNOW. The apparent redness of snow, as seen from a distance, is often an effect of light, which adds a peculiar charm to mountain and winter landscapes, particularly in the mornings and evenings, when the rays of the sun fall most obliquely on the surface of the snow. But snow is occasionally found both in polar and alpine regions of a really red colour. This phenomenon seems to have been observed by the ancients, as a passage in Aristotle apparently refers to it; but it attracted no attention in modern times till 1760, when Saussure observed it in the Alps, and from chemical experiments concluded that the red colour was owing to the presence of some vegetable substance, which he supposed might be the pollen of a plant. The next observations on red snow were made in the arctic expedition under Captain Ross, when it was found extending over a range of cliffs on the shore of Baffin's Bay for eight miles, and the red colour penetrating the snow in some places to a depth of 12 feet. On the return of the expedition in 1819, the colouring matter, as then existing in the melted red snow, was subjected to careful examination by Robert Brown and by Francis Bauer, the former most eminent botanist pronouncing it to be an unicellular plant of the order *Algæ*, whilst the latter referred it to *Uredo*, a genus of *Fungi*, and called it *U. nivalis*. Baron Wrangel afterwards declared it to be a *Lichen*, and called it *Lepraria Kermesina;* but Agardh and Dr Greville of Edinburgh—the latter of whom obtained specimens from the Scottish island of Lismore—on further examination, returned to the opinion of Brown, an opinion

which has since been fully confirmed, and the plant is generally known by the name *Protococcus nivalis*, given to it by Agardh, or *Palmella nivalis*, given to it by Sir William Hooker. The motions of this microscopic plant in the earlier stages of its existence have led some observers, and among them eminent naturalists, to regard the organisms which they found in red snow as animalcules. See PALMELLACEÆ. But whilst no doubt is now entertained of its real nature, it is not impossible that animal as well as vegetable life may exist in red snow, and that real animalcules may have been observed. The red snow plant consists, in its mature state, of brilliant globules like fine garnets, seated on, but not immersed in, a gelatinous mass.

REDSTART (*Phœnicura ruticilla*, or *Ruticilla phœnicura*), a bird of the family *Sylviadæ*, nearly allied to the Redbreast, but having a more slender form and a more slender bill; the male in summer having the head, back, and wing-coverts gray; the forehead white, with a narrow black band at the base of the bill; the throat, sides of the neck, and face jet black; the wings brown, the tail and upper tail-coverts bright rufous chestnut, with a strip of dark brown on the centres of the two middle feathers; the rest of the under-parts mostly pale chestnut. The female is grayish-brown, with neither the white



Redstart (*Ruticilla phœnicura*).

nor the black on the head, and less red on the tail. The R. is widely diffused over Europe, Asia, and the north of Africa. It appears in Britain as a summer bird of passage, and is found in almost all parts of the island. It is a bird of very lively manners, remarkable for the way in which it flits about, in and out of some hedge or bush, where it is in quest of insects. It has a very soft melodious song, which is continued during the breeding-season far into the night, and resumed at early dawn. In confinement it becomes very tame, and has been known to imitate the song of other birds, and even to learn a tune.—The BLUE-THROAT (q. v.) also belongs to the same genus.—The AMERICAN R. (*Setophaga ruticilla*) is a small bird of the family *Muscicapidæ*, or Fly-catchers, common in most parts of North America, a bird of great beauty, and extremely active in its movements.

REDUCTION, in Arithmetic, is the conversion of a quantity in one denomination to an equivalent one of a different denomination. In the reduction of a quantity from a higher to a lower denomination, the process of multiplication is employed; and, contrarily, division is the needful process when a number of a lower denomination has to be reduced to an equivalent number of a higher.

REDUCTION, in Scotch law, means the annulling or setting aside of a deed or instrument, and thereby annihilating its legal effect. The action of reduction commences with a summons requiring the defender to bring the deed into court to be set aside, stating the reasons of reduction. The defender, if he defend the action, returns the summons, which implies that he intends to satisfy the production; i. e., to produce the document, and maintain its validity. The action can be raised only by a person who has some title or interest connected with the matter.

REDUCTION OF METALS. A metal is said to be reduced to its metallic state when it is separated from the condition of a chemical compound in which it exists as an ore. This is generally effected either by the direct action of heat, or by heating the compound along with a *reducing agent.* Thus, when oxide of mercury is simply heated, the oxygen is given off as gas, and mercury or quicksilver appears as metal. Again, when sulphuret of lead is heated with iron, sulphuret of iron is formed, and the lead is reduced to its metallic state. In this case, the iron is the reducing agent. The principal reducing agent employed in metallurgy is carbon, or rather the gas carbonic oxide, which is formed under certain conditions when carbon is burned. See METALLURGY, IRON.

REDUIT, in Fortification, is a central or retired work within any other work, intended to afford the garrison a last retreat, whence they may capitulate. It is commonly of masonry, loopholed, and often circular. Many engineers doubt the use of reduits altogether, as blocking up the working space, being themselves inconvenient for the men, and incapable of protracted defence, while they frequently mask the fire of other works more to the rear.

RED-WATER—also known as Bloody Urine, Moor-ill, and Hæmaturia—is a disease of cattle, and occasionally of sheep; it depends upon the eating of coarse indigestible innutritive food, on continued exposure to inclement weather, and on other such causes, which lead to a deteriorated state of the blood. In England and Ireland, it affects cattle of all ages and of both sexes; but in Scotland it is most common amongst milch cows within a fortnight after calving. The appetite and rumination are irregular, the bowels speedily become constipated, and the urine reddened with the broken-down red globules of the blood. In the more advanced stages of serious cases, the urine is black. A dose of physic must at once be given, and for an adult animal may consist of ½ lb. each of common and Epsom salt, 3 ounces of sulphur, and a pound of treacle, mixed together in two bottles of water. Roots should be withheld, and the food consist of sound hay with a little cake. A full supply of pure water is further essential. Weakness, which is apt to supervene, may be warded off by giving several times daily two ounces each of gentian and ginger in a quart of ale. To prevent red-water, attend to feeding and watering, place rock-salt in the pastures and yards; and, as has been successfully done in Cheshire and other English counties, improve the grazing-lands, notorious for the production of the disease, by draining, liming, and manuring; and where these means are ineffectual, by ploughing them up, and cropping them for a few years.

REDWING (*Turdus iliacus*), a species of Thrush (q. v.), well known in Britain as a winter bird of passage. It spends the summer in the northern parts of Europe and Asia, and even occurs in Iceland; its winter range extends to the Mediterranean. In size, it is about equal to the Song Thrush or Mavis. The general colour is a rich clove-brown on the head, upper parts of the body, and tail; the wing-feathers darker, but with lighter external edges; the lower parts mostly whitish, tinged and streaked with brown; the under wing-coverts and axillary feathers bright reddish-orange.

The R. arrives in Britain rather earlier than the Fieldfare (q. v.), and, like it, congregates in large flocks. It has an exquisite song, which it pours



Redwing (*Turdus iliacus*).

forth from the summit of a high tree, gladdening the woods of the north.

RED-WOOD, the heart-wood of *Adenanthera pavonina* (*Leguminosæ*), a large tree growing in India, where it is called *Ruktu-chundun*, and is much used in dyeing red. Small quantities are brought to this country for the same purpose, but it is not in much demand.

REE, Lough, a lake in the middle of Ireland, between Connaught on the west and Leinster on the east, is an expansion of the river Shannon (q. v.).

REED, the common English name of certain tall grasses, growing in moist or marshy places, and having a very hard or almost woody culm. The Common R. (*Phragmites communis*, formerly *Arundo Phragmites*) is abundant in Britain and continental Europe, in wet meadows and stagnant waters, and by the banks of rivers and ditches. It grows chiefly in rich alluvial soils. The culms are 5—10 feet high, and bear at the top a large much branched panicle, of a reddish-brown or yellowish colour, having a shining appearance, from numerous long silky hairs which spring from the base of the spikelets. The two outer glumes are very unequal; and the spikelet contains 3—4 perfect florets, with a barren one at the base. The culms, or stems, are used for making garden-screens, for light fences, for thatching houses and farm-buildings, for making a framework to be covered with clay in partitions and floors, for battens of weavers' shuttles, &c. So useful are reeds in these ways, and particularly for thatching, that it is found profitable in some places to plant them in old clay-pits, &c. Probably they might be planted with advantage in many peat-mosses, where they are now unknown. The plant is not very common in Scotland; but in the fenny districts of the east of England, it covers large tracts called *reed-ronds*, and similar tracts occur in many parts of Europe.—Nearly allied to this is *Arundo donax*, the largest of European grasses, plentiful in the south of Europe, and found in marshy places as far north as the south of the Tyrol and of Switzerland. It is 6—12 feet high, and has very thick, hollow, woody culms, and a purplish yellow panicle, silvery and shining from silky hairs. The woody stems are an article of commerce, and are used by musical instrument makers for reeds of clarionets, mouth-pieces of oboes, &c. They are also made into walking sticks and fishing-rods. The creeping roots contain much farina and some sugar. —*Arundo Karka* is supposed to be the grass called *Sur* in Sinde, of which the flower-stalks are very fibrous; and the fibres, being partially separated by beating, are twisted into twine and ropes.—The Sea Reed is *Ammophila* (q. v.)—or *Psamma arundinacea*.

REED. See Loom.

REED, in Music, the mouthpiece of a hautboy, bassoon, or clarionet. Also, a piece of metal with a brass spring or tongue attached to it in such a way that the admission of a current of wind causes it to vibrate and sound a musical note. The reed is of two kinds, the *beating* reed and *free* reed. The former is used in the reed-pipes of an Organ (q. v.), and requires to be placed within a tube in order to produce a musical sound. It consists, as in fig. 1, of a metallic cylinder *a*, with the front part cut away, and a brass spring or tongue *b*, placed against the opening, and attached at the upper end. The admission of air to the pipe in which the reed is placed causes the tongue to vibrate against the edge of the opening, so as to cover and uncover the slit, through which the air passes to the pipe above, the regularly repeated beat producing a musical note, dependent for its pitch on the length of the tongue, which is regulated by a strong spring of wire *c*, pressing against it. The quality of the sound is determined to a large extent by the length and form of the pipe in which the reed is placed. The *free* reed differs from the beating reed in this, that the tongue is a little smaller than the opening, and strikes, not the edge of the opening, but the air. The admission of a current of wind causes it to yield so as to let the air pass, while, after recovering its position, it is carried back by its momentum equally far on the other side, and continues vibrating so long as the current of air is continued, the result of the pulsations being a musical note. The invention of the free reed has been ascribed to M. Grenié, a Frenchman, who brought it into use, but it has been long known to the Chinese. Its note is more smooth and mellow than that of the beating reed, and it has the advantage of not requiring a pipe, which is a necessary appendage to the latter. Besides being occasionally adapted to organ-pipes, it is used without a pipe in the Harmonium (q. v.), as represented in the subjoined fig. 2, where *a* is the brass frame containing the slit, *b* the reed in the frame, while *c* represents the position of the reed in the instrument, it being a little below the slit, when not in motion.

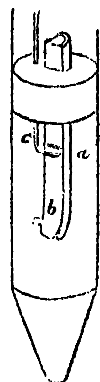


Fig. 1.

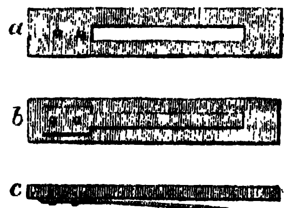


Fig. 2.

REED MACE. See Typha.

REED WARBLER. See Warbler.

REEF, in Naval matters, is a portion of a sail included between the bottom of the sail and a parallel row of eyelet-holes a short distance above it, or between such row of eyelet-holes and a parallel row higher up. The object of the reefs is to reduce the size of the sail when the wind becomes boisterous. For this purpose, cords are inserted at each eyelet-hole, which, when the sail is unreefed, hang freely. When the intention is to take in a reef, the sail is slightly lowered; the men climb out along the yard or boom below its lower edge, fold the loose sail on the yard, and fasten the reefing-lines securely round the yard and sail thus

folded. There are also systems of small ropes in some ships by which the sail may be reefed from the top without the men incurring the danger of going out on the yard during tempestuous weather.

REEL, a lively dance peculiar to Scotland, which may be danced by two couples, but admits a greater number. The music is in general written in common time of four crotchets in a measure, but sometimes in jig time of six quavers.

REEL-WINDING MACHINE, a beautiful contrivance, now used by the manufacturers of sewing-thread. It is for the purpose of winding the thread on to the reels upon which it is sold for use; and not only does it turn a number of reels round so as to wind the cotton upon them, but, by a peculiar arrangement, every turn is so managed that the cotton is reeled with the most beautiful regularity, each turn of the thread being laid on by the side of the previous one, and never crossing it.

RE-ENTERING ANGLE, in Fortification, is an angle in the line of works of which the apex points away from the front. As an example, the flanks of a bastion make re-entering angles with the adjoining curtains. Advantage is commonly taken of the comparatively sheltered position of these angles to form *places d'armes* for the assembly of troops.

RE-ENTRY is a legal term used in leases, whereby the landlord stipulates for power to re-enter the premises in certain conditions, such as the non-payment of rent after the lapse of a specified period from the time it became payable. Before, however, the power of re-entry can be exercised, all the conditions must be strictly complied with.

REEVE (Sax. *gerefa*, Ger. *graf*), a magistrate existing in early times in England and elsewhere in Northern Europe, whose duties were at first principally fiscal. In the Saxon period in England, he represented the lord of a district, whether township or hundred, at the folkmote of the county; and within his district, he levied the lord's dues, and performed some of his judicial functions. The word still survives in the shire-reeve or sheriff (*scyr-gerefa*), who was at first assessor to the ealdorman or earl, who, along with the bishop, presided, but afterwards became himself the presiding officer. Similar functions were exercised in boroughs by an elective officer called the Portreeve. In Anglo-Saxon times all the English boroughs were subject to the rule of a portreeve, for whom the Norman Conquerors substituted a bailiff, who, in the larger towns, was allowed to assume the appellation of mayor.

REEVE, a verb used in speaking of ropes, signifies the passing of a rope through any hole, dead-eye, block, or pulley, in conjunction with which it is to be used.

REFERENCE, as a legal term, means the sending by a court, or by agreement of the parties, the decision of a matter to an arbitrator, or to an officer of the court or master. In cases where parties, without going the length of commencing litigation, agree to arbitration, they usually execute a deed or agreement of submission; but after litigation has begun, if the judge think it would be better that an arbitrator should settle the dispute, an order of reference is drawn up for that purpose.

REFERE'NDARY, a name given in the early kingdoms of Europe to a public officer, whose duty was to procure, execute, and despatch diplomas and charters. The office of Great Referendary to the monarchy of France merged eventually in that of Chancellor.

REFI'NING OF METALS. The last operation connected with the smelting of copper, tin, lead, and some other metals, is usually called the refining process. With copper, for example, the impure or 'blister' copper, containing from 95 to 98 per cent. of the metal, alloyed usually with small quantities of iron, tin, antimony, &c., is melted in a refining furnace, and exposed to the oxidising influence of the air. By this means, the foreign metals present become oxidised, and rise to the surface as slag, which is skimmed off; the oxide of copper, formed during the process, being afterwards reduced by throwing coal on the surface of the melted metal, and stirring with a pole of green wood. The disengagement of gases from the wood during the 'poling' causes the metal to splash about, and so expose every portion of it to the reducing action of the coal; thus the oxide of copper is deprived of its oxygen, and the copper rendered nearly pure.

Tin is also refined by throwing billets of green wood into it while in a melted state, which has the effect of bringing impurities to the surface as froth, in a somewhat similar way to the oxidising of foreign metals in copper. See TIN.

Lead is purified from antimony and tin by an analogous mode of oxidation, and silver is separated from it by a special process. See LEAD.

The refining of iron is a name applied to the process for partially separating the carbon from cast iron, and is described under IRON. Of the less important metals used in the arts, zinc, antimony, and mercury do not usually undergo any special refining process; aluminium, it is said, will not afterwards purify when once reduced to the metallic state; and nickel, of which German silver is largely composed, is refined by a process or processes kept strictly secret by manufacturers.

We may state here that no metal is ever quite pure in its commercial state, even though it has gone through the usual operation of refining, but all are to a certain extent alloyed with certain others. For the great majority of purposes, it is not necessary that metals should be chemically pure, and when it is, they can only be made so by refined chemical processes.

It will be readily understood, however, that it is always necessary to carry the refining of gold and silver further than the less valuable metals. To render gold sufficiently pure for manufacture into coin, an ingenious process has, within the last few years, been proposed, by which fused gold is mixed with about 10 per cent. of black oxide of copper, and then stirred so as to oxidise any foreign metals which happen to be present. The oxide of copper does not fuse, but is disseminated through the melted metal, and oxidises any tin, antimony, or arsenic, and causes them to rise to the surface, so that they may be skimmed off. Perfectly pure gold is prepared by dissolving the metal in aqua-regia—a mixture of nitric and hydrochloric acids—and precipitating silver (with which it is almost always alloyed) as well as any other foreign metals by chemicals which have no action on the solution of gold. The metallic gold is afterwards precipitated as a finely-divided powder, by a salt of iron, and is then fused and cast into bars.

Silver is rendered pure by dissolving it in nitric acid, filtering the solution, and then precipitating the metal with common salt as a chloride of silver. This is afterwards mixed with sulphuric acid, and then, by introducing bars of zinc, a chloride of zinc is formed, whilst the silver is reduced to the metallic state.

REFLE'CTION. See CATOPTRICS, HEAT, UNDULATORY THEORY. In the articles referred to, the laws of reflection are stated, illustrated

geometrically, and deduced from the modern theory of the nature of light and radiant heat.

We may now *mention* one or two curious circumstances connected with reflection, which could not well be given in any of these articles.

In general, a reflected ray is more or less *polarised* (see POLARISATION); and if the reflecting surface be metallic, or if it be formed of a substance of high refractive index, as diamond, it is in general *elliptically* polarised.

In various cases, principally known by the laborious investigations of BREWSTER (q. v.), the *colour* of the reflected light not only differs from that of the incident light, but is different for different angles of incidence, and for different azimuths of the plane of reflection. The theoretical explanation of these very singular facts has not been as yet very satisfactorily given. In fact, the problem of reflection from the surface of a metallic or a crystalline substance is one which presents difficulties of a very formidable kind, principally from the want of definite data for the formation of a satisfactory fundamental hypothesis; and, in a secondary manner, from the intricacy of the requisite mathematical investigations.

REFLEX ACTION. See NERVOUS SYSTEM.

REFORM, PARLIAMENTARY, the name generally given to the acts which passed the legislature of the United Kingdom in 1832, by which an extensive change was made in the system of parliamentary representation. Parliamentary reform had for many years before been a topic of popular agitation. So far back as 1782, a motion by Mr Pitt for a reform of the franchise was lost by a majority of 20, and similar motions in the years 1783 and 1785 by majorities of 44 and 74. The horror inspired by the excesses of the French Revolution caused a reaction, and the repression for a time of all liberal tendencies; and it was not till some time after the close of the French war that the desire for reform again manifested itself. Mercantile distress had added to the popular dissatisfaction, which was fomented by the revolutions of 1830 in France and Belgium; and an adjustment of the inequalities of the representative system, with an extended franchise, was looked forward to as a panacea for all the ills under which the community laboured. The demand for parliamentary reform became more imperious on the death of George IV. and accession of William IV. Meetings were held over all the country, and though there was no open rioting, a constant alarm was kept up. On the resignation of the Duke of Wellington, November 16, 1830, the celebrated Reform ministry of Earl Grey came into office. Parliament assembled on February 3, 1831, and on March 1, Lord John Russell proposed his first scheme of Reform. After a long and animated discussion, the bill passed the second reading by a majority of 1. On the motion for a committee, General Gascoyne moved, as an amendment, that the number of representatives for England and Wales should not be diminished; and the amendment being carried by a majority of 8, the ministry abandoned the bill, and resorted to a dissolution. The cry arose through the country of 'The bill, the whole bill, and nothing but the bill;' and when the new parliament assembled on June 14, a large majority, including the whole of the county members for England, excepting four or five, were pledged to support the bill, which was again introduced on June 24, and passed the third reading in the House of Commons by a majority of 113. The Upper House, however, threw it out on the second reading by a majority of 41, and parliament was immediately prorogued. It reassembled on December 6, and on December 12 the third Reform Bill was introduced in the Commons by Lord John Russell, which did not, like the former bills, diminish the number of members—a concession which the Opposition considered as an improvement, and it had a majority of 116 on the third reading. In the Lords, the second reading was carried by a majority of 9, and the bill ordered to be committed. In committee, Lord Lyndhurst carried, by a majority of 35, a motion that the disfranchising clause should be postponed, and the enfranchising first considered; on which, the king having refused to accede to a creation of peers sufficient to carry the bill, the ministry resigned. A week of intense public agitation followed. The government were induced to resume office on the king granting them full powers to secure majorities by the creation of peers; but eventually that expedient was avoided by a sufficient number of Lords absenting themselves to leave ministers a majority on the third reading, when the bill passed by a majority of 84, receiving the royal assent by commission on June 7, 1832. Reform bills for Scotland and Ireland were immediately afterwards introduced and carried. For the details of the alterations made by these several measures on the distribution of members and the electoral qualification, see PARLIAMENT. The changes effected were so sweeping as to cause many of the advocates of Reform to be apprehensive that the balance of the constitution would be disturbed by the preponderance of the democratic element; but the determination of the masses was such, that the conservative influences of the country were powerless to stay or modify the measure. Yet no sooner was the contest at an end, than a reaction followed, falsifying equally the hopes of the supporters of the bill, and the fears of its opponents.

In 1854, a new Reform Bill was introduced by Lord John Russell for a further extension of the suffrage; but it was unaccompanied with anything like popular excitement, and was withdrawn in consequence of the breaking out of the Crimean war. A Reform Bill brought in by Mr Disraeli in 1859, was rejected in the Commons by a majority of 39, and the consequence was a dissolution and change of ministry. The ministry of Lord Palmerston and Lord John Russell, which succeeded to power, introduced and afterwards withdrew a Reform Bill.

REFORMATION. The *Reformation* denotes the great spiritual and ecclesiastical movement which took place in Europe in the 16th c., and as the result of which the national churches of Britain, of Denmark, Sweden, Norway, and Holland, and of many parts of Germany and Switzerland, became separated from the church of Rome. In other countries, such as Hungary and France, the same movement detached large portions of the population from the Roman Catholic faith, yet without leading to a national disruption with the papacy.

The causes of this movement were manifold; but, as may be supposed, they present themselves in very different lights to members of the different religious communions.

To Protestants, the Reformation appears as the natural result of causes which had long been at work, and which it needed but a fitting occasion to call into active operation. The church of Rome had gradually, from the 6th c., or the time of Gregory the Great, extended not merely its influence, but its direct control and government, over all the countries of Western Europe—in many places, as in Ireland, Scotland, and part of England, displacing the old national churches, which had been planted in earlier times, and which had

survived under comparatively simple forms of government. Although some uncertainty may exist as to the exact constitution, doctrine, and discipline of the old Scoto-Irish Church, there can be no doubt that it did not acknowledge the direct superintendence of Rome, and that it was only after a long and varying struggle, not terminating till the 12th c., that the popes fully established their authority, and set up over this ancient church a completed hierarchy connected with Rome. It is only by keeping this in view that some features of the Reformation can be clearly understood and appreciated.

The natural result of the wide-spread supremacy of the Roman Church was, that the spiritual aspects of the church became gradually more and more merged in its mere machinery of external government. Everything that could give power and efficiency to it as an institute was carefully watched and nursed; but when, in the course of the 15th c., and even earlier, spiritual life began to die out in the centre of this vast system of ecclesiastical government in Rome itself, the baleful effects of such spiritual decay speedily began to tell through all its borders. The growing corruption shewed itself in many forms—in a prevailing ignorance among the monks and higher clergy; in the perversion of ecclesiastical offices, and especially in the grossly materialistic abuse of spiritual privileges and censures. The ignorance of the monks is depicted in strong colours in the satires of Erasmus and Buchanan, and in such books as the *Epistolæ Obscurorum Virorum.* The great impetus which the friars had given to the papal power in the 13th c., had died out. They had sunk, from being zealous and active preachers, into bigots and mendicants, cumbering the ground. The secular clergy were hardly less corrupted; in many cases, the higher dignitaries of the church had no interest in the spiritual duties of their office, and gave themselves up entirely to the pleasures of a worldly life, or, at best, to the duties of political or military activity. The revival of the old classical literature in Italy—the spirit of what is called the *Renaissance*—accelerated this movement of spiritual decay. The papacy itself became half-pagan. The church was little cared for even as an organ of government; it was used as an engine of self-aggrandisement and the most extravagant luxury.

These general causes, however, might have proved insufficient to produce any such radical change as the Reformation; they had been long felt and deplored. Wycliffe in England, and Huss and Jerome of Prague had denounced, in the most vigorous manner, the prevalent abuses; they had excited a wide-spread popular interest, and even to some extent secured royal favour. But the overbearing power of the church proved too strong for the reforming spirit in its earlier manifestations. In the midst of his evangelical activity, Huss was betrayed, through the promise of a safe-conduct, into making his appearance at the Council of Constance in 1414. No sooner was he fairly in the power of the Council, than he was confronted with certain articles of abjuration; and refusing to submit without being convinced, he was, in defiance of the promise made to him, condemned to be burned as a heretic. The rising spirit of reformation was temporarily quenched in the flames which consumed the intrepid martyr of Bohemia. The Council did nothing effectual to repair the abuses which he had denounced. The church remained apparently strong after a temporary excitement and alarm.

In the meantime, however, throughout the 15th c., new seeds of preparation for the great work were everywhere ripening. The literary movement begun in Italy, was spreading in Germany, in England, and elsewhere. Reuchlin arose in Germany, Erasmus in Holland; England welcomed the latter as a student in the early reign of Henry VIII, while he was engaged in preparing his edition of the Greek New Testament. Various manifestations of spiritual life shewed themselves, especially in the Rhine country. The Brethren of the Common Lot took up in a more evangelical form the succession of the Brethren of the Free Spirit, whose teaching had degenerated into a species of spiritualistic pantheism. Gerhard Groot and Thomas à Kempis represent this comparatively evangelical tendency, and springing from them, various men—the best known of whom is John Wessel of Gröningen—have been called 'Reformers before the Reformation.' If we add to these influences the internal political agitations of the Germanic empire—whose traditional opposition to the papacy was by no means forgotten—the growth of a healthy political activity in many of the great municipalities of the empire, we shall find abundant incitements to the Reformation in the social state of Europe, especially of Germany, and in the church in the beginning of the 16th century. It required only a definite spark to kindle the slumbering agitation, and this was not long wanting.

Whatever may be said of the doctrine of Indulgences as theoretically stated, it is not denied by the most zealous defenders of the institution that it has at all times been liable to the gravest abuse; and it so happened that at the period in question the abuse had risen to a scandalous height. (See INDULGENCE.) An agent of this system, of the name of Tetzel, a Dominican friar, came into Saxony in the year 1517, and established himself not far from Wittenberg, for the purpose of disposing of papal indulgences. He was a man of low and unscrupulous character, gifted with great volubility, and he carried on his traffic in a peculiarly offensive and shameless manner. Luther, who had been recently created a Doctor in the Holy Scriptures, and entered upon his career as a teacher in the university of Wittenberg, was roused to indignation by what he heard of the doings of this man. He saw the evil influence of the system upon the members of his own flock, and determined to raise his voice against it. 'God willing, I will beat a hole in his drum,' he exclaimed, with reference to the coarse vehemence with which Tetzel commended the value of his wares. He posted on the door of the church of Wittenberg his famous 95 theses, and thereby created such a popular excitement that Tetzel was silenced, and obliged to retreat from the field. This was the beginning of the Reformation in Germany. Luther's attention once aroused to the working of the papal system, he proceeded to examine it in different aspects, and the result was, that his resolution to assail it strengthened as he advanced. Neither cajoling nor threats, neither the bland softness of Cajetan, nor the blundering polemics of Eck, were of avail to silence him. A papal bull was at length fulminated against him; and he consummated his audacity by burning the bull at one of the gates of Wittenberg, on the memorable 18th December 1520.

About the same time, and without any concert whatever, a similar movement against the sale of indulgences took place in Switzerland. In 1520, the Franciscan friars, who had the charge of promulgating the indulgences there, were opposed by Zwingli, a preacher in Zürich. His opinions were declared to be heretical by the two great universities of Cologne and Louvain; but he declared himself unmoved by the voice of Catholic authority; the magistrates and people of the city supported him;

and the result was the active spread of the reforming spirit, not only throughout Zürich, but the neighbouring cantons of Schaffhausen, Basel, and Bern.

In the meantime, Luther advanced in his work. He addressed the 'Christian nobles' of Germany, loudly declaring that the time to rise against Rome was come. 'Talk of war against the Turk,' he cried; 'the Roman Turk is the fattest Turk in the world; Roman avarice the greatest thief that ever walked the earth; all goes into the Roman sack, which has no bottom, and all in the name of God too!' Step by step, he opened his eyes to the errors of the papacy, and no sooner reached a new conviction himself, than he launched it forth into the world. He pronounced against the Seven Sacraments, in favour of only three—Baptism, the Lord's Supper, and Penance. He contended for the use of the cup to the laity. His rapid writings—no fewer than three—in the same year, which he closed by burning the papal bull (1520), circulated in thousands, and were eagerly read. Nearly all Germany was aflame with the new spirit, and it seemed as if the empire would be wholly lost to the papacy.

The interposition of Charles V. produced at this crisis a temporary interruption in the progress of the Reformation. Charles was crowned Emperor of Germany in January 1521, and immediately summoned at Worms a diet of the sovereigns and states of the empire. The papal leaders exerted themselves to have Luther summarily condemned at the diet. They succeeded so far as to make the emperor issue an edict for the destruction of the reformer's writings; but the estates refused to publish it unless Luther was allowed an opportunity of meeting his adversaries, under safe-conduct, and answering before the diet to the charges preferred against him. Luther was accordingly summoned to meet the assembled authorities of Germany at Worms. He gladly and proudly embraced the summons. His journey thitherward was a kind of triumphal procession, so enthusiastically did the people, and even some of the priests, greet him along the route. He is said to have entered Worms chanting 'Ein feste Burg ist unser Gott'—the *Marseillaise* of the Reformation, as has been remarked. The same night, however, the intrepid monk was heard in an agony of prayer in his room, overwhelmed by the solemnity of his circumstances. On the afternoon of the following day, he made his appearance before the diet, and confronted its assembled statesmen and princes—a scene grand and striking in its features, which has been often painted. He was urged to retract; but he was immovable. In a speech, first in German, and then in Latin, he expressed his determination to abide by what he had written, and called upon the emperor and the states to take into consideration the evil condition of the church, lest God should visit the empire and German nation with His judgments. A direct answer was demanded from him whether he would retract or not. 'I neither can nor dare retract anything,' he replied, 'unless convinced by reason and Scripture; my conscience is captive to God's Word, and it is neither safe nor right to go against conscience. There I take my stand. I can do no otherwise. So help me, God. Amen.'

It was evident that Luther was not to be intimidated. He remained some days in Worms; but neither persuasion nor threatening availed with him. He received orders to depart; and in the end of April, he set out on his way home. As he left Eisenach a few days afterwards, and was passing through a narrow defile near the fortress of Altenstein, he was seized by two armed horsemen with attendants, carried to the neighbouring castle of the Wartburg, and there lodged in safety. This apparently violent seizure was the friendly act of his sovereign, Frederick of Saxony, to protect him from the destruction that his intrepid conduct was certain to have called down upon him had he remained at liberty. The ban of the empire had followed him, and temporary obscurity was his only safety.

The Reformation suffered, however, from the absence of his guiding hand. Carlstadt and others, when left alone at Wittenberg, gave the rein to many excesses. Reform seemed likely to merge into licence. The heart of Luther, after a year's residence in obscurity, was incontrollably stirred within him to be at his old post again, directing and controlling the spirit of innovation; and he returned to Wittenberg in March 1522. The lawless movement, however, which had received impulse, was not to be restrained. It broke out in many quarters. Social oppression and misery added to the flames of fanaticism. The peasantry rose in arms, headed by the Anabaptist Münzer, and the horrors of a civil war raged throughout Germany. Luther exerted all his influence to stem the unhappy tide of affairs; exhorted the nobles on one hand, and the peasants on the other; and at no part of his career did he shew a higher spirit and wisdom, although he has not always got the credit of this.

With his hands thus full of practical labour, he plunged at the same time into a violent controversy with Erasmus, which by no means reflected so much credit on him. Erasmus and he had hitherto, although in different ways, co-operated in the same cause; but they were men of such different spirit and temper, that a separation between them was inevitable. Luther had felt this for some time, but he was reluctant to come to an open breach. 'Do not join your forces to our adversaries; publish no books against me, and I will publish none against you,' he had said in a letter in 1524. On the publication, however, of Erasmus's treatise *De Libero Arbitrio*, Luther could no longer hold silence. He responded in the same year, 1525, by his counter-treatise, *De Servo Arbitrio*; and the war of words waged hotly and vehemently between them. Luther was not only hearty but violent in denunciation; his indignation sunk into coarseness, while the audacity of his logic plunged him into unguarded and even unmoral paradoxes, which left him gravely open to the cold and telling sarcasms of his opponent. He was evidently himself little satisfied with the result, and even his warmest admirers cannot see much to admire in the spirit and zeal which he manifested on this occasion.

Hitherto, the Reformation had not received any legal establishment. Frederick of Saxony, while warmly protecting Luther and his followers, did not yet take any steps to displace Romanism by legal enactment, and set up in its stead a Reformed Church. This was now done, however, by Frederick's successor. He commissioned Luther and Melanchthon to prepare a new form of church government and church service for his dominions. His example was followed by the other princes and states in Germany that had renounced the papal supremacy. The Reformation thus obtained substantive existence and civil support. It was no longer merely a spiritual movement, it became henceforth also a political power. This important result shewed itself conspicuously at the Diet of Spires in 1526. An endeavour made at this diet to suppress the new religious movement, and to insist upon the rigorous execution of the papal sentence against Luther and his followers, was successfully opposed by a majority of the princes and representatives of states; and it was resolved, on the contrary,

that the princes should have full power to order ecclesiastical affairs in their own dominions as they thought proper. This resolution served greatly to extend the Reformation. The emperor was too busy for some years with his own affairs to be able to interfere with the course of events; and the reforming cause was in the meantime greatly strengthened and advanced in various states of Germany.

This period of progress and tranquillity, however, was soon interrupted. A new diet was convoked at the same place in 1529; and under the more powerful influence of the papal party, backed by the presence of the emperor's brother, who presided in the diet, the measures of the former diet were recalled, and all changes in religion declared to be unlawful except such as might be authorised by an approaching General Council. It was then that the Elector of Saxony, the Landgrave of Hesse, and other princes of the empire who had already embraced the Reformation, and established it in their dominions, made a solemn *protest* against the action of this diet—a circumstance which gave rise to the name of *Protestants*, which has since attached to all the followers of the Reformation. See PROTESTANT.

While the Reformation thus ran its course in Germany, and was adopted by the civil authorities in many states, it was making corresponding progress in Switzerland, and there at length also, after a famous and elaborate conference held at Bern in 1528, under the countenance of the civil authorities, the supremacy of the pope was abolished, and the Reformed doctrines, in even a broader and more definite shape than in Germany, were declared to be the only doctrine of Scripture. Bern, Zürich, and Basel continued to be the main centres of the reformed movement in Switzerland; but the reformed doctrines gradually extended throughout the great majority of the cantons. Chiefly those surrounding the Lake of Lucerne remained, as they remain to this day, strongly attached to the Roman Catholic faith. The chief point of difference between the reformers in Switzerland and Germany concerned the doctrine of the Eucharist. Luther, while abandoning the doctrine of a literal conversion of the bread of the Eucharist into the body of Christ, known under the name transubstantiation, held to a modification of this doctrine, under the name of consubstantiation. The bread did not become the body of Christ literally, but it contained the body of Christ. Christ was in the bread as really 'as the sword in the scabbard or the Holy Ghost in the dove.' Zwingli, on the contrary, and his co-reformers in Switzerland, discarded all outward presence of Christ in the Eucharist. The service, in their view, was merely memorial. 'It is the spirit that quickeneth; the flesh profiteth nothing:' a passage which they applied to prove the worthlessness of any supposed eating of the body of Christ, even if such a thing were possible.

The dispute which arose on this subject between the reformers of Germany and Switzerland, and especially between their respective leaders, Luther and Zwingli, proved a serious impediment to the cause. Philip of Hesse sought to bring about a reconciliation between them. Zwingli, Bucer, and Oecolampadius met with Luther and Melanchthon at Marburg in the year 1529, on his invitation, and held a long conference, but without any result. Luther was not to be moved in a matter which he held to be of the very essence of the Christian faith. The combatants separated with their opinions unchanged.

When Charles V. perceived the firmness of the Protestant princes in the position which they had taken up, he became anxious for temperate and conciliatory measures. In an interview with the pope at Bologna, he urged, but without success, the necessity of a General Council, and at the same time took means to convene personally with the princes at a new diet to be held at Augsburg. In the view of this important convention, the reformers prepared, at the instance of the Elector of Saxony, a statement of their special doctrines. The basis of this, the famous *Confession of Augsburg*, was seventeen articles, delivered by Luther to the elector at Torgau, which had been adopted at a conference at Schwabach in 1529. These articles, enlarged and polished by the careful and moderate pen of Melanchthon, were submitted in twenty-eight chapters to the diet which met at Augsburg in June 1530. Twenty-one chapters were occupied with the statement of the opinions of the reformers, and the remaining seven devoted to an exposure of the errors of popery. The reading of this Confession by the Chancellor of Saxony, in name of the Protestant states, made an earnest and favourable impression upon the diet. The papal authorities submitted a reply, which was approved by the emperor, and ordered by him to be accepted as a conclusion of the religious differences which had arisen. The Protestants responded instead by an answer to the papal document, which was afterwards expanded by Melanchthon, and published under the title of *Apology for the Confession of Augsburg*.

The religious schism between the emperor and many of the states of Germany seemed now approaching a crisis which could only terminate in war. A renewed decree, exceeding in severity that of Worms, was launched against the reformers. They on their part appreciated the solemnity of the crisis, and met, headed by the Elector of Saxony, first at Smalkald, and then at Frankfurt, in the years 1530 and 1531, when they entered into a treaty of defensive alliance, and encouraged each other in the resolution to maintain their religion and liberties against the threatened encroachments of the imperial edict. To Henry VIII. of England, who was at that time just beginning his own erratic career of reformation, they sent a special invitation to co-operate with them, on the basis of the doctrines of the *Confession of Augsburg*, an invitation to which he responded, but which issued in no practical result. The emperor, notwithstanding the strongly hostile attitude which he had assumed, was not prepared as yet to plunge into hostilities. The Turks were menacing the frontier of the empire; he had his own personal objects to gain in the advancement of his brother Ferdinand to the dignity of king of the Romans, an object which he could not accomplish without a majority of votes at an imperial diet. He was content, therefore, to enter anew into negotiations with the Protestant princes; and after many unavailing projects of reconciliation, a treaty of peace was concluded between them at Nürnberg in 1532. The Protestants agreed to support him against the Turks, and to acknowledge Ferdinand as king of the Romans; while the emperor in his turn agreed to abrogate the edicts of Worms and Augsburg, and allow the Protestants the free exercise of their religion until some settlement by a General Council or a diet of the empire.

It was the emperor's necessities, and not his will, which consented to the peace of Nürnberg; there was no prospect, therefore, of its being lasting. But the Protestants availed themselves of their temporary repose to strengthen themselves and extend their power. The emperor continued to urge the pope to convoke a General Council. At length, in 1536, Paul III. issued a summons for a council to meet at

Mantua in the following year; but the Duke of Mantua being disinclined to receive so many turbulent guests into his quiet city, the project did not take effect. In anticipation, however, and convinced that no council convened under the exclusive influence of the pope would deal fairly with the subject in dispute, the Protestants met at Smalkald in the year 1537, and while solemnly protesting against a mere Italian or papal council, at the same time agreed to a new summary of their doctrines, drawn up by Luther, to be presented to the assembled bishops. This summary is known under the name of the *Smalkald Articles*, and along with the *Confession of Augsburg* and the *Apology for the Confession*, constitutes to this day the doctrinal basis of the German Lutheran Church.

At length, in 1546, the same year in which Luther, worn out by his many toils, died somewhat suddenly at Eisleben, a council assembled at Trent. It was soon evident that no compromise was practicable between the Protestant and the papal party, and both sides prepared to try the venture of war. When the Council of Trent promulgated its decrees, and the Reformed princes in the Diet of Ratisbon protested against their authority, the emperor raised an army to compel their obedience. They, on their part, were ready with their forces, and marched into Bavaria against the emperor. The results, in the first instance, were severely disastrous to the Protestant cause, chiefly through the division of the princes, and especially the perfidy of Maurice, the nephew of the Elector of Saxony. Various attempts at reconciliation and compromise were again attempted, in which Melanchthon took a prominent part; but, as before, they came to nothing. A change of fortune gave a temporary triumph to the Protestant arms, and the result was that Charles concluded a formal treaty at Passau, in 1552, which may be considered the foundation of the Protestant liberties of Germany. The Protestants stipulated for the free exercise of their religion, until the meeting of a diet which should settle a permanent religious peace; and in return, they agreed to lend assistance against the Turks, who were still menacing the frontiers of the empire. The promised diet assembled at Augsburg in 1555, and framed articles for the religious pacification of Germany, according to which all adherents of the Augsburg Confession of Faith were left in the undisturbed enjoyment of the rights which they had acquired, were freed from papal domination, and allowed to order their religious concerns as seemed best to them; Protestants and Catholics alike being bound to respect each others' convictions, and not to injure or persecute one another on account of religion, under penalty of being proceeded against as enemies of the empire. This treaty of Augsburg terminates the period of the Reformation in Germany.

In the neighbouring countries of Denmark and Sweden, the progress of reformed opinions had proceeded still more rapidly than in Germany. In both these countries, the sovereigns took the lead in enlightening their people, and freeing them from the tyranny of the church of Rome. In Sweden particularly, Gustavus Vasa shewed both great courage and prudence in carrying out a reforming policy. He invited learned Lutheran teachers into his dominions, and shewed special zeal in the circulation of a Swedish version of the Scriptures, made by one of these teachers, named Olaus Petri, who occupies the most prominent place among the Swedish reformers. At an assembly of the states at Westeraas, in 1527, while the reformers in Germany were still struggling for bare existence, it was unanimously resolved that the Lutheran doctrines should be adopted in Sweden, and a Reformed Church, entirely independent of Rome, established. The same result occurred in Denmark in 1539, when an assembly of the Danish states at Odensee gave formal sanction to a plan of religious doctrine, worship, and discipline, drawn up by Bugenhagen, a disciple and friend of Luther, whom Christian III. had invited from Wittenberg for the purpose.

In France, the progress of the Reformation was of a much more uncertain and wavering character. As early as 1523, the new doctrines had spread greatly in many parts of France, under the countenance of Margaret, queen of Navarre, sister of Francis I., the constant rival of Charles V. The names chiefly associated with this early phase of the French Reformation, besides that of Margaret herself, are those of Lefevre and Farel, the latter particularly a man of active and fiery zeal, who had been originally a priest in Dauphiné, and whom we find subsequently associated with Calvin in Geneva. The university of Paris became for a time strongly infected with the 'new learning,' and many of the nobility, as well as the people, were actually inclined to throw aside the superstitions of Rome, and embrace a more scriptural form of faith. But the violent and inconsistent policy of Francis I., and the fierce spirit of faction which the struggle engendered, gave an unhappy turn to the course of events in France, and prevented the Reformation from obtaining in that country anything of the same national recognition that it obtained in Germany and elsewhere. Both Farel and Calvin were driven by the violence of persecution into Switzerland. The latter settled for a time at Basel, where he completed and published the first edition of his *Institutes*. The famous preface, addressed to Francis I., bears the date of Basel, August 1, 1535. In the following year, he repaired to Geneva, where Farel, already labouring in the work of the Reformation, retained him by a 'divine menace,' and he began that great career as a reformer, theologian, and legislator which has rendered his name so illustrious.

In Spain and in Italy, the spread of the Reformation, which in both countries had taken an active and hopeful start, was almost entirely suppressed by the power of the Inquisition. The church of Rome was able to bring its whole force to bear upon these countries, unchecked by political hostility. The flames of martyrdom, which elsewhere seemed to kindle a double zeal for the cause which they aimed to destroy, were here kept burning with such an incessant and devouring cruelty, as to consume all life out of the new movement, and brand the name of Protestant with the infamy which, in the popular mind, always attaches itself to hopeless failure.

The same policy was attempted in the Netherlands. Upwards of 100,000 of the inhabitants are said to have fallen under the atrocious cruelty of Charles V., and his son, Philip II. But the spirit of political freedom and moral earnestness proved at length an equal and finally, through a protracted and bloody conflict, a victorious match for the blood-thirstiness even of Philip and Alva; and the principles of the Reformation, after a Calvinistic type, were at length established in the United Provinces, along with the political supremacy of the House of Orange.

The Reformation in England is marked by peculiar features—an under-current of popular movement, dating even from the time of Wycliffe, and a somewhat inconsistent and wavering series of political changes during the reigns of the three Tudor princes, Henry VIII., Edward VI., and Elizabeth. In the beginning of the 16th c., as

early as the first movements of Luther, there are indications of a revival of evangelical religious life among the tradesmen of London, and the peasantry in different parts of the country, particularly in Lincolnshire. The popular mind had begun to look with suspicion and ridicule upon some of the most characteristic doctrines of Romanism. A story is told by Foxe of a Lincolnshire peasant, busy thrashing his corn in his barn, accosted by a neighbour. 'Good-morrow; you are hard at work.' 'Yes,' replied the man, in allusion to the doctrine of transubstantiation, 'I am thrashing God Almighty out of the straw.' The residence of Erasmus in England, in the beginning of the reign of Henry VIII., stimulated a spirit of biblical inquiry among the educated classes, which, while it remained for the most part faithful to the church of Rome, as in the case of More and others, yet helped to advance a reforming movement. The study of his Greek Testament was eagerly entered upon by a few students at both universities, especially at Cambridge. We find Biling, Tyndale, and Frith associated at the latter place in 1520; and in the decade following, Cranmer, Ridley, and Latimer all come into prominent notice. It is at the end of this latter period—the year 1529—a year before the meeting of the Diet of Augsburg in Germany, that the Reformation in England may be said to take its first decided advance. In this year, the usurpations of the clergy, and the manifold ecclesiastical abuses prevailing in the country, were the subject of parliamentary legislation. The negotiations as to Henry's divorce from Catharine had been proceeding for some time, and the country was greatly excited by the course of events. In 1533, Henry was married to Anne Boleyn, and his former marriage with Catharine declared void. All appeals to Rome were forbidden. In the two following years, the sovereign was declared to be the supreme head of the church of England, with authority to redress all errors, heresies, and abuses in the church; the monasteries were dissolved; and parliament petitioned that a new translation of the Scriptures might be authorised, and set up in churches. In all this course of reformation, however, there was but little religious impulse on Henry's part, for we find him again, in 1539, yielding violently to the spirit of reaction, and passing the famous statute known as the Six Articles, which rendered it penal to deny the doctrine of transubstantiation, or to affirm that priests might marry. Cranmer, who had been for some years Archbishop of Canterbury, laboured to prevent their passing; and Latimer resigned his bishopric as soon as they were confirmed.

With the accession of Edward VI., in 1547, the Reformation greatly advanced. The statute of the Six Articles was repealed, with other reactionary measures of the close of Henry's reign. The parliament of 1548 established the use of the Book of Common Prayer; the clergy were permitted to marry; the cup was allowed to the laity; and in 1551, the forty-two articles of religious belief, afterwards reduced to thirty-nine, were promulgated. The temporary restoration of popery under Mary, and the final establishment of Anglican Protestantism under Elizabeth, are well-known events, belonging to the special history of these reigns.

In Scotland, the reforming impulses began with Patrick Hamilton about the same time that Cranmer and Latimer first appear active in England. Hamilton was educated in Paris and in Germany, and learned there the doctrines which he introduced into his native country. There was something, indeed, of the same popular movement, known under the name of Lollardism in Scotland, as in England, and Hamilton's preaching may have served to kindle up the dying embers of this movement. His early death, in 1528, undoubtedly produced a great effect. 'Men began,' says Knox, 'very liberally to speak.' 'The reik of Mr Patrick Hamilton infected as many as it did blow upon.' After Hamilton, George Wishart appears as the next hero-martyr of the Scottish Reformation; and in connection with him—as his reverend disciple and companion—we first hear of John Knox, who became finally the great leading spirit of the movement, by whose influence popery was extirpated, and the Reformation established in Scotland in 1560. The Scottish Reformation followed the type of the Calvinistic Reformation in Geneva, where Knox had taken refuge during the period of persecution in Scotland, and acted for some years as the companion of Calvin. Episcopacy was abolished, and the fabric of the Reformed Kirk set up in every respect as far as possible in opposition to the papal system, which had become the opprobrium of the people.—Ranke's *History of the Reformation in Germany;* D'Aubigné's *History of the Reformation;* Waddington's *History of the Reformation.*

Such is the light in which this great religious revolution presents itself to the Protestant. Catholic students naturally regard it very differently; and although the name REFORMATION has come to be generally adopted as the historical designation of the religious movement of the 16th c., this name is only accepted by Catholics under protest, and as a conventional phrase, the rigorous meaning of which they distinctly repudiate. The more strict writers among Catholics employ in its stead the name 'Pseudo-Reformation,' or 'So-called Reformation.'

As regards the event itself, Roman Catholics, while they admit that many abuses existed in the church which called for reform, and many superstitions existed which deformed the true character of religion among the ignorant masses of the people, contend nevertheless, not only that the extent and the nature of these abuses and superstitions are greatly exaggerated, but also that the task of reforming them did not imply either the necessity or the lawfulness of a separation from the church. They assert that the conduct and character of many of those who were most prominently engaged in the movement prove them to have been influenced by corrupt and unworthy motives, that in their effort to throw off the obedience of Rome, they rather sought emancipation from moral and disciplinary restraint, than the purification of the religious system of the church; that the change in many of the countries in which it was effected was brought about mainly through the agency of the sovereign, with a view to the appropriation of the revenues of the church; and that in others it was brought about by appealing to the prejudices of excited and unreasoning multitudes, who were taught to confound the system with its abuses, and who were incapable of distinguishing the true doctrine of the church from the superstitions which were justly held up for reprobation. And thus in the view of Catholics, the true REFORMATION of the church was not that which has been described above, as carried out by the seceders of the 16th c., but that internal change which was effected by the decrees of the Council of Trent, and by the religious revival which took place simultaneously with the sittings of that assembly. They dwell much on the fact, that all the notable successes of Protestantism were at its first origin, and that, in the words of Lord Macaulay, if Protestantism had at its first onset 'driven Catholicism to the Alps and Pyrenees,' so Catholicism, in its turn, 'rallied

and drove back Protestantism even to the German Ocean.'

As to the moral and religious results of the Reformation, the same difference of opinion exists. That the very necessity of action which it created had a beneficial influence on their own church, by the internal revival to which it led, Catholics freely admit; but they look upon the revolt against authority, the inauguration of religious innovation and scepticism, the separation from the church, and the disruption of Christian unity, as fraught with moral and intellectual evil; and a work of much learning has been devoted, by the well-known German Catholic theologian, Dr Dollinger, to establishing this point by the confessions of the first reformers themselves, and their immediate successors. See *Die Reformation, ihre innere Entwicklung und ihre Wirkungen*, von J. Dollinger (3 vols. 8vo, Regensburg, 1848).

REFORMATORY SCHOOLS. The first institution to which Queen Victoria gave her name was a reformatory for girls, established at Chiswick in 1834, under the name of the Victoria Asylum. It was the first of its kind in England; but as early as 1788, the germ of the reformatory movement may be traced in the working of the Philanthropic Society, which established a sort of farm-school, on the family system, for the reformation of depraved and vagrant children. A second school was established in Warwickshire in 1818, but was suffered to die for want of support, as was the third, set on foot by Captain Brenton in 1830. Captain Brenton was the first who took his stand on the principle, that no child under 16 should be sent to prison, but to some place where training might be provided in industry and virtue; and the girls' school at Chiswick originated in his influence, and was worked on his plans. On his death in 1839, reformatory efforts ceased for several years in England—the institution of the Philanthropic Society at St George's in the Fields being a mere refuge for the destitute. But its chaplain was the Rev. Sydney Turner, since the well-known Inspector of Prisons and Reformatories; and his attention was directed to the reformatory movement abroad, where its principles were flourishing in the School of Mettray (q. v.), founded in 1839, and the Rauhes Haus (q. v.) at Hamburg. In 1847, the St George's Institution restricted its care to boys charged with or convicted of crime; and at length, in 1850, broke up and removed to Redhill, establishing there, on the family system, the greatest Reformatory in England. From this time the progress was rapid and sure. In 1852, several schools were opened: Hardwicke Court by Mr Baker; Kingswood, by Miss Carpenter; Stoke Farm, by Mr Joseph Sturge; and Saltley, near Birmingham, by Mr Adderley. Government then determined to legalise the system. Three parliamentary committees having pronounced against the imprisonment of children, the Reformatory Schools Act, 17 and 18 Vict., was passed in 1854, followed by amending Acts in the three succeeding years. One of the first principles of the movement was voluntary agency, and this agency was still retained. The Act sets out in its preamble, 'that whereas Reformatory Schools have been, and may be established by voluntary agency in various parts of the country, it is expedient that more extensive use should be made of these institutions.' The state certifies the school to be fit for its purpose, provides that, on conviction, after a short imprisonment, not more, generally, than 14 days, the child shall enter the school, and remain for a term of years, under the sole management of its conductors, paid for by the Treasury at the present fixed rate of 6s. per week. A portion of this is recoverable from the parents, if they are in a condition to contribute to the child's support. Counties and boroughs may furnish from their funds money to aid in the establishment of reformatory schools. The results of the schools have been regularly presented to the public in the Reports of Her Majesty's Inspector, who has often traced to their operation the late marked decline in juvenile delinquency, which was previously rapidly increasing. By the end of 1856, 34 schools were in existence; 11 were added in 1857; and in 1860, the number in Great Britain was 59. At the close of 1863, there were 64 in Great Britain, of which 14 were Scotch. The number of children under detention in reformatories at the close of 1863, was 4677; of these, 1000 were girls. The admissions during the year to reformatories decreased from 1338 to 1209, and increased in industrial schools from 591 to 633, giving a net decrease of 87 in the number of children committed to both descriptions of schools. The late education Commission said of these schools: 'Upon the whole, none of the institutions connected with education appear to be in a more satisfactory condition.' It has, however, been urged that children should not be sentenced to reformatories on a first conviction, as it was becoming the rule to do, and that all children under 12 should be sentenced to an Industrial (q. v.) school instead. The cost to the country for reformatories alone, during the year, was £65,920, and the amounts recovered from the parents on account of their children who had been committed, were £2450.

REFORMED CHURCHES, a term employed in what may be called a conventional sense, not to designate all the churches of the Reformation, but those in which the Calvinistic doctrines and still more the Calvinistic polity prevail, in contradistinction to the Lutheran (q. v.). The influence of Calvin proved more powerful than that of Zwingli, which, however, no doubt considerably modified the views prevalent in many of these churches. The R. C. are very generally known on the continent of Europe as the *Calvinistic Churches*, whilst the name *Protestant Church* is in some countries almost equivalent to that of *Lutheran*. One chief distinction of all the R. C. is their doctrine of the sacrament of the Lord's Supper, characterised by the utter rejection not only of transubstantiation, but of consubstantiation; and it was on this point, mainly, that the controversy between the Lutherans and the Reformed was long carried on. See LORD'S SUPPER and SACRAMENTARIAN CONTROVERSY. They are also unanimous in their rejection of the use of images, and of many ceremonies which the Lutherans have thought it proper to retain. Among the R. C. are those both of England and Scotland, notwithstanding the Episcopalian government of the former, and the Presbyterianism of the latter; the Protestant Church of France, that of Holland and the Netherlands, many German churches, the once flourishing Protestant Church of Poland, &c., with those in America and elsewhere which have sprung from them.

REFRACTION. See DIOPTRICS; HEAT; REFRACTION, DOUBLE; UNDULATORY THEORY. In the articles referred to, the ordinary experimental laws of single and double refraction are stated; geometrical consequences, such as the mode of action of lenses, prisms, telescopes and microscopes, are deduced from them; and the connection of these laws with the hypothesis of undulations is explained.

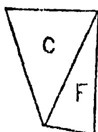
It remains that we should give the refractive and dispersive powers of a few common substances, to shew the great diversity which exists amongst them, especially in the non-proportionality of

dispersion to refraction. The following results are due to Fraunhofer, who was the first to employ, for this purpose, Wollaston's discovery of the *fixed lines* in the Spectrum (q. v.), without whose aid all such observations are of comparatively little value. The lines B, D, and H, which we have selected for the table, correspond to definite rays of red, orange, and violet respectively.

Substance.	Refractive Index. B.	D.	H.	Dispersion. (H—B).
Flint Glass, . .	1·6277	1·6350	1·6710	0·0433
Crown Glass, .	1·5258	1·5296	1·5466	0·0207
Water, . .	1·3310	1·3336	1·3442	0·0132
Turpentine, .	1·4705	1·4744	1·4939	0·0234

The numbers in the last column roughly shew how far the red and violet are separated by prisms (of a given angle) of the various substances; and even this brief list shews how erroneous was Newton's idea that dispersion is proportional to refraction, an idea which led him to the conclusion that an Achromatic (q. v.) combination was impossible.

Thus we see that the refractive indices of flint and crown-glass are (approximately) as 16 : 15, while the dispersive power of flint is more than double that of crown. Hence, if we construct prisms of the two materials, such that the angular separation of red and violet which they produce shall be equal, the angle of the flint will be far less than that of the crown, and the whole refraction also less. The combination of two such prisms, with their edges turned opposite ways, as in the cut, will thus bend (or refract) a ray of white light without separating the red from the violet—and thus we may obtain *refraction without colour*.



This is not strictly the case, on account of what is called *Irrationality of Dispersion*, the existence of which is easily seen from the above table. Thus, if we form two spectra, by means of properly constructed prisms of different media, such that the lines B and H coincide, the lines D will not generally coincide. In other words, some substances draw out the red end of the spectrum more than the violet—and *vice versâ*. Thus, from the above table,

	D—B.	H—D.
Flint Glass, . .	0·0073	0·0360
Crown Glass, . . .	0·0038	0·0170

But 73 : 360 : : 38 : 187; hence we see that the distance from B to D in flint bears a less proportion to that from D to H than it does in crown. Thus, if, by proper arrangements, as before mentioned, B and H be made to coincide, D will be nearer the middle of the crown spectrum than of the flint. Hence a double achromatic lens, composed of flint and crown, may be made to refract equally any *two* colours of the spectrum; but there will be a slight non-accordance of the remaining colours. *Three* colours may be made coincident by using a *triple* lens, but this is now rarely constructed.

REFRACTION, CONICAL. In certain cases, light, passing as a single ray through a plate of a crystallised body, emerges as a hollow *cone* of rays; and in others, a single ray, falling on the plate, becomes a cone inside the crystal, and emerges as a hollow cylinder. These extraordinary appearances were *predicted* from theory by Sir W. R. Hamilton (q. v.), and experimentally realised by Lloyd. They form one of the strongest arguments in favour of the truth of the undulatory theory of light. In our article on that subject, we shall briefly describe them in connection with the theory of double refraction in biaxal crystals.

REFRACTION, DOUBLE. The great majority of crystallised bodies: and in general, all transparent bodies (such as glass), when unequally strained, as by pressure, heat, or rapid cooling, divide a single ray which falls on their surface into two. Through a plate of such a substance every object appears doubled. The cause of this singular phenomenon cannot be explained without reference to Polarisation (q. v.), and it is therefore deferred to the article on the UNDULATORY THEORY OF LIGHT, where the principal experimental facts will be given along with their theoretical explanation.

REFRAIN (Fr.), otherwise called the *burden* of a song, a part of a song which is repeated at the close of every stanza.

REFRIGERANTS. This term is applied in Medicine both to internal and external cooling remedies. The medicines of this class prescribed for internal use cause a refreshing feeling and a sensation of coolness throughout the system, although they do not in reality diminish the temperature of the body. Their principal use is in the treatment of febrile and inflammatory affections, in which the benefit they produce appears to depend on the fact, that their direct action on the coats of the stomach occasions, by nervous sympathy, a temporary reduction in the force of the circulation. They likewise have the power of allaying gastric irritability and the morbid sensations of heat and thirst. The following are the refrigerants in most common use for internal administration: citric and tartaric acids taken in combination with bicarbonate of potash as effervescing draughts, ripe oranges, lemons (in the form of Lemonade, q. v.), chlorate of potash (ten grains dissolved in water, and sweetened with syrup, to be taken every second hour), and nitrate of potash, which may be taken in the same manner as the chlorate, or as *nitre-whey*, which is prepared by boiling two drachms of nitre in a pint of new milk; the strained milk may be given in frequent doses of two or three ounces. Many continental physicians regard oxalic acid in the form of lemonade as the best of all the refrigerants. Its poisonous character must not be forgotten, but five grains dissolved in half a pint (or more) of water may be taken, in divided doses, in the twenty-four hours with perfect safety.

The following remarks on the external application of refrigerants are for the most part condensed from Mr Simon's able article on 'Inflammation' in Holmes's *System of Surgery*. Cold, continuously applied, is the sedative of every vital manifestation; and in theory, it may be regarded as being in direct and essential opposition to the causes of inflammation; and as it is thus an antidote to the causes of inflammation, rather than a remedy for the resulting changes, so, in order to get full advantage from its use, it should be employed from the moment when these causes begin to operate. Cold is of great value in the treatment of wounds, especially such as are made in surgical operations. The local temperature can be thus continuously moderated, care being taken that it is not too much reduced, so as to occasion gangrene. Under the effective use of cold (together, of course, with absolute rest of the parts), many a knee-joint, whether wounded accidentally or by a surgical operation, recovers without permanent injury. In most cases, local cooling is best effected by water of the desired temperature. Cloths wetted with it are spread over the surface which is to be acted on, their original low temperature being retained either by their being continuously dripped upon by means of a bundle of threads inserted in a reservoir of cold water, and acting like a siphon, or by their being frequently re-wetted or changed. Their surface should be exposed as freely as possible to the air, so as to secure ample space for evaporation. In

cases where great cold is required—as, for example, in cases of strangulated hernia, of inflammation of the brain and its membranes, or of fever with well marked cerebral symptoms—bladders of pounded ice are preferable to wetted cloths. Both as regards the degree of cold and the period of its application, the surgeon should to a considerable degree be influenced by the sensations of his patient. When its application gives comfort, it is almost certain to be doing good; and in most cases where it gives discomfort, it is doing harm.

A notice of the external use of refrigerants would be imperfect without a reference to the memoir of Dr Esmarch, Professor of Surgery in the University of Kiel, *On the Use of Cold in Surgery*, recently (1861) translated by Dr Montgomery for 'The New Sydenham Society.' His mode of application is by means of India-rubber bags filled with ice, snow, or some freezing mixture; or of thin iron-plate reservoirs of cold water, made by means of a mould of gutta-percha to fit any inflamed part. In a case of 'chronic purulent inflammation of the knee-joint,' the ice-bags were continuously applied for 12 weeks. Dr James Arnott's investigations on 'Local Anæsthesia by Cold,' in the *Medical Times* for the years 1854–5–7, and Dr Chapman's method of treating nervous diseases by the application of cold to the spine, as recorded in his *Functional Diseases of Women* and elsewhere, require also a passing reference.

The application of cold, either through the medium of air or water, to the body generally is a subject of great importance. The use of cold air is especially seen in febrile cases, in which the physician directs the sick-room to be kept cool, and the patient (unless in exceptional cases) lightly clothed. Mr Paget reports that the most successful cases of pyæmia that have fallen under his observation were those in which the patients were freely exposed to the air. The value of baths and cold affusions is noticed in the articles BATH and HYDROPATHY. In addition to what is there stated, it is important to know that prolonged immersion in water as warm as 95° Fahr. may be the means of reducing febrile temperature.

REFRIGERATION OF THE EARTH. That the earth is at present losing heat, is an immediate consequence of the observed fact, that the temperature of its crust *increases* as we descend; for, in any conducting body, the flux of heat is always from warmer to colder parts; and the rate at which heat is thus lost can be easily calculated if we know the conducting power (for heat) of the rocks forming the crust, and the rate at which the temperature increases with the depth under the surface; for the conductivity may be measured by the quantity of heat which, in unit of time, passes (per square foot of surface) through a layer of rock of one foot thickness, whose upper and lower surfaces are maintained at temperatures differing by 1° F. Hence, if k be the conductivity of the crust, and if the temperature increases by 1° F. every x feet of descent, the quantity of heat lost, in unit of time, from each square foot of surface, is measured by $\frac{k}{x}$. k and x can be determined by experiment for any particular locality, and thus the loss may be determined. These quantities vary very much in value in different localities, thus x is sometimes as great as 110, sometimes as small as 15. The value 50 is generally supposed to give a fair average—that is, for every 50 feet of descent the temperature increases by 1° F. Hence the stifling heat experienced in deep mines. At the depth of a mile, the temperature would on this estimate exceed that of the surface by more than 100° F. Beds of coal at such a depth could not be wrought, as the temperature would far exceed that of tropical climates.

Three methods of accounting for this increase of temperature towards the interior of the earth have been proposed: 1. That the earth was originally molten, either throughout, or for a considerable depth over the whole surface; 2. That the internal heat is due to chemical combination; 3. That the earth, ages ago, passed through a region of space where the temperature was far above that of its present envelope.

Of (1) it is sufficient to say, that such a state is the necessary consequence of impact, if the earth was formed by the aggregation of cosmical masses due to their mutual gravitation. It is scarcely doubted now that this is the origin of solar and stellar heat; and the fact of the moon's turning always the same face to the earth (see ROTATION), is most easily explained on the hypothesis of her original fluidity. The figure of the earth (see EARTH) is also a strong argument in favour of this hypothesis. This explanation of the origin of the earth's internal heat is obviously consistent with the increase of temperature as we descend below the surface—for a spherical mass of molten rock will evidently soon cool externally, while its low conductivity (rendered still lower by the high temperature) will prevent the interior from supplying anything at all equivalent to the loss at the surface. On this hypothesis, the rate of loss of heat must constantly become smaller and smaller, but very slowly; and it is possible that a considerable portion of the earth's mass may still be in a melted state.

The second hypothesis is perfectly sufficient to account for observed facts, but is apparently unnecessary, since (1) has been shewn to be, in the universe, a *vera causa*. It is only alluded to here because Lyell and other distinguished geologists have endeavoured to shew from it that the earth need not be losing heat on the whole, a result perfectly untenable. They suppose the internal heat to be generated by chemical combination, and then that the compounds so formed are again decomposed by electric currents produced by the heat (see THERMO-ELECTRICITY), and are thus prepared to combine again, and reproduce the heat. Were this the case, we should have a Perpetual Motion (q. v.), and, in the present state of science, this is known to be impossible.

The third hypothesis, proposed by Poisson, is easily shewn to be inconsistent with known facts; for, if the passage through the warm region be supposed to have taken place from 1250 to 5000 years ago, the temperature at the earth's surface must have been from 25° to 50° F. above the present mean temperature, which is inconsistent with history. If it took place 20,000 years ago, the mean temperature must have been 100° F. above its present value. Geology shews that this cannot be accepted. And, if it be supposed to have taken place more than 20,000 years ago, the requisite temperature must have been incompatible with the existence of animal or vegetable life.

From the above argument, which is taken from a paper by Professor W. Thomson in the *Transactions of the Royal Society of Edinburgh* (1862), it is obvious that the first hypothesis is that which we must, in the present state of our knowledge, adopt.

Supposing the temperature of melting rock to be from 7000° F. to 10,000° F. (and experiments seem to shew that it lies somewhere between these limits), the present state of temperature of the crust indicates that the earth became solid somewhere

between 100,000,000 and 200,000,000 years ago. These estimates are based on the known laws of conduction of heat discovered by Fourier, and the conductivity of rocks and soils, deduced by Principal Forbes (q.v.) from observations made in the neighbourhood of Edinburgh. But as these observations refer to conductivity at very moderate temperatures only, and as Forbes has shewn that conductivity is in general lowered by heating, the lower limit above may possibly be reduced to *twenty million years*.

In conclusion, we may mention, to shew how little the internal heat of the earth has to do with surface temperature, that Thomson has shewn (*Proc. R. S. E.*, 1863–1864) that if we accept the estimate of 1° F. of increase of temperature for 50 feet of descent, the earth's surface is heated (by conduction of heat from within) only $\frac{1}{75}$th of a degree Fahrenheit.

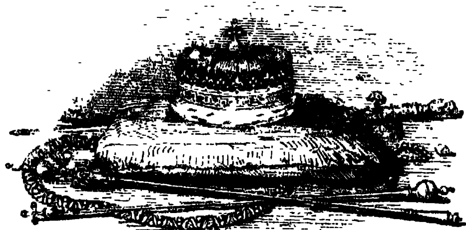
REFRI'GERATOR. See FREEZING MIXTURES.

REFUGEE' (Fr. *refugié*), a name given to persons who have fled from religious or political persecution in their own country, and taken refuge in another. The term was first applied to those Protestants who found an asylum in Britain and elsewhere at two different periods, first during the Flemish persecutions under the Duke of Alva in 1567, and afterwards in 1685, when Louis XIV. of France revoked the Edict of Nantes. Of the numerous French artisans who settled in England on this last occasion, the most part Anglicised their names, as by substituting Young for 'Le Jeune,' Taylor for 'Tellier,' &c., so that their posterity can now hardly be recognised as of foreign origin. According to Lower (*Patronymica Britannica*) De Preux became Deprose, and 'Richard Despair, a poor man,' buried at East Grimstead, was, in the orthography of his forefathers, Despard. There were also refugee families of a higher class, some of whose descendants and representatives came to occupy a place in the peerage. The Bouveries, Earls of Radnor, are descended from a French refugee family. The refugee family of Blaquière was raised to the Irish peerage; and Charles Shaw Lefevre, Lord Eversley, is the representative of a family of Irish refugees. The military employment offered in Ireland after 1688 maintained a considerable number of foreign Protestants. General Frederic Armand de Schomberg, was raised by William III. to the peerage, becoming eventually Duke of Schomberg. A Huguenot officer of hardly less celebrity was Henry Massue Marquis de Ruvigny, created by William III. Earl of Galway. Lord Ligonier was also of a noble Huguenot family, and England has had at least one refugee bishop in Dr Majendie, Bishop of Chester, and afterwards of Bangor. Among other refugees of note may be enumerated Sir John Houblon, Lord Mayor of London in 1695, one branch of whose family is now represented by Lord Palmerston; Elias Bouheran or Boireau, D.D., whose descendant was created a baronet as Sir Richard Borough of Baselden Park, Berkshire; as well as Martineaus, Bosanquets, and Papillons, whose descendants have attained more or less eminence in the country of their adoption. The first French Revolution brought numerous political refugees to England, and Great Britain is noted throughout Europe for affording a ready asylum to refugees of all classes, both political and religious. Weiss' *History of the French Protestant Refugees, from the Revocation of the Edict of Nantes to the Present Time*, translated by Hardman (London, 1854); J. S. Burn's *History of the French, Walloon, Dutch, and other Foreign Protestant Refugees settled in England from the Reign of Henry VIII. to the Revocation of the Edict of Nantes* (London, 1846).

REGALBU'TO, or RAGALBUTO, a city in the island of Sicily, in the province of Catania, and 30 miles west-north-west of the city of that name. It is beautifully situated on a hill near the right bank of the river Salso, and with Mount Etna bounding the prospect on the north-east. Its only object of interest is the cathedral. Pop. 8995.

REGA'LIA, the ensigns of royalty, including more particularly the apparatus of a coronation. The regalia of England were, prior to the Reformation, in the keeping of the monks of Westminster Abbey, and they are still presented to the sovereign at the coronation by the dean and prebendaries of that church. During the Civil War, the crown and most of the regalia fell victims to Puritan zeal; and on the restoration of the royal family, new ensigns had to be made for the coronation of Charles II., which, with occasional alterations and repairs, have continued in use down to the present day. The regalia, strictly so called, consist of the crown, the sceptre with the cross, the verge or rod with the dove, the so-called staff of Edward the Confessor (made in reality for Charles II.), the blunt sword of mercy called Curtana, the two sharp swords of justice, spiritual and temporal, the ampolla or receptacle for the coronation oil, the anointing spoon (probably the only existing relic of the old regalia), the armillæ or bracelets, the spurs of chivalry, and various royal vestments. All these, with the exception of the vestments, are now exhibited in the Jewel-room in the Tower of London, in which are also a smaller crown, sceptre, and orb for the coronation of a queen-consort, two other queen-consorts' sceptres—one of ivory, made for Marie d'Este; and the state-crown of silver and diamonds, which was used at the coronation of Queen Victoria, containing a large ruby and sapphire, the former said to have been worn by Edward the Black Prince. The Prince of Wales's crown of gold, without stones, is modern.

The proper regalia of Scotland consist of the crown, the sceptre, and the sword of state. The crown probably belongs to the time of Robert Bruce, and is adorned with crosses and fleurs de lis alternately. It was originally an open crown, but two concentric arches were added in the reign of James V., surmounted at the point of intersection by a mound of gold and a large cross patée. The sceptre is of the time of James V.; the sword was a present from Pope Julius II. to James IV. in 1507. During the Civil War, the regalia were removed by the Earl Marischal for safe custody from the Crown-room of Edinburgh Castle, their



Regalia of Scotland.

usual place of deposit, to his castle of Dunnottar; and while Dunnottar was besieged by the Parliamentary army, the regalia were preserved by being conveyed by stratagem to the manse of Kinneff, by the wife of Ogilvy of Barras, the lieutenant-governor, and the wife of the minister of Kinneff.

From the Restoration to the Union, the regalia continued to be kept in the Crown-room as formerly; at the beginning of each session, they were delivered to the Earl Marischal or his deputy, in whose custody they remained while parliament was sitting, and were afterwards restored to the charge of the Treasurer. William, ninth Earl Marischal, who opposed the Treaty of Union in all its stages, declined to witness its consummation, but appeared by his deputy, who took a written protest that the regalia should not be removed from the castle of Edinburgh without warning given to him or his successor in office. From that time till 1818, the regalia remained locked in a chest in the Crown-room, away from public gaze, and it came to be the general belief that they had been secretly conveyed away to London, an idea confirmed by the keeper of the Jewel-office in the Tower shewing a crown which was alleged to be that of Scotland. On the 4th February 1818, an order being obtained by warrant under the sign-manual of George IV., then Prince-regent, the chest in the Crown-room was broken open, and the crown, sword, and sceptre were found as they had been deposited at the Union, along with a silver rod of office, supposed to be that of the Lord High Treasurer. They are now in the charge of the officers of state for Scotland, as commissioners for the custody of the regalia, and are exhibited in the Crown room, along with a ruby ring, set with diamonds, worn by Charles I. at his coronation at Holyrood in 1633; the golden collar of the Garter, sent by Elizabeth to James VI.; the St George and Dragon, or badge of the Order of the Garter; and the badge of the Order of the Thistle, with figures of St Andrew and Anne of Denmark, set in diamonds. These latter insignia were bequeathed by Cardinal York, the last of the Stuarts, to George IV., and sent to Edinburgh Castle in 1830, by order of William IV.

REGALIA, or **REGALE**, Right of, a right in ecclesiastical things, claimed by sovereigns in virtue of the royal prerogative, which has frequently been the subject of controversy between kings and popes. It involved several points as to presentation to benefices, most of which formed the object from time to time of negotiation by concordat; but the most serious conflict arose out of the claim made by the crown to the revenues of vacant benefices, especially bishoprics, and the co-ordinate claim to keep the benefice or the see vacant for an indefinite period, in order to appropriate its revenue. This plainly abusive claim was one of the main grounds of complaint on the part of the popes as to the practice of lay Investitures (q. v.), and it reached its height in England under the first Norman kings, especially William Rufus. The most memorable conflict, however, on the subject of the regalia was that of Innocent XI. (q. v.) with Louis XIV., which was maintained with great pertinacity on both sides for several years, the king extending the claim to some of the French provinces which had until then been exempt from it, and the pope refusing to confirm any of the appointments of Louis to the sees which became vacant, as long as the obnoxious claim should be persisted in. The dispute continued till after the death of Innocent, Louis XIV. having gone so far as to seize upon the papal territory of Avignon in reprisal; but it was adjusted in the following pontificate, the most obnoxious part of the claim being practically abandoned, although not formally withdrawn.

REGA'LITY, a species of territorial jurisdiction formerly existing in Scotland, nearly akin to the Palatinate (q. v.) in England. The lands were given over by the sovereign *in liberam regalitatem* to some powerful noble, called a *Lord of Regality*, to control as he best might with the strong hand. The lord of regality exercised the highest prerogatives of the crown, including originally the four pleas, often having a complete court of his own, with seneschal, chancellor, chamberlain, and other officials, in imitation of royalty. An offender amenable to a court of regality might have been repledged from the sheriff, or even from the Court of Justiciary. Jurisdictions of regality were abolished by act 20 Geo. II. c. 50.

RE'GALS (perhaps from *rigabello*, an instrument used prior to the organ in the churches of Italy), a small portable finger-organ in use in the 16th and 17th centuries, and perhaps earlier. Many representations exist of this instrument, including one sculptured on Melrose Abbey. The tubes rested on the air-chest, which was filled by the bellows; and the bellows were managed with one hand, and the keys with the other. Until 80 years ago, there existed in the royal household an officer called the *Tuner of Regals.*

REGA'RDANT, a term used in heraldry with reference to an animal whose head is turned backwards. See Passant and Rampant.

REGA'TTA. This word originated in the Venetian dialect, and signified a boat-race, held annually with great solemnity among the gondoliers. Thence the expression has extended its meaning, and is now applied to all rowing or sailing matches indiscriminately, and especially to the contests between yachts.

REGELA'TION. This is an exceedingly ill-chosen term for a somewhat obscure phenomenon, inasmuch as it implies a previous state which may not have existed. Unfortunately, the term has come into general use, and we must make the best of it. The principal fact to be explained is the adhesion of two pieces of ice brought into contact, not merely in air, but even when both are immersed in water at such temperatures as 100° F. Several explanations have been proposed, of which we may specially mention those of Faraday, Forbes, and J. Thomson.

Faraday's idea seems to be, that in liquid and solid bodies the proximity of particles in a particular state tends to produce the same state in other particles; and thus, that a film of water between two plates of ice tends to assume the solid state. There are many singular phenomena in physical science which are apparently explicable by this suggestion; but with all due deference to so great an authority, the so-called explanation seems merely to *shift* the difficulty, without in any way overcoming it.

Forbes starts with the assumption, that ice is essentially colder than water, and therefore that there is constantly a transfer of heat from water to ice which is in contact with it; the effect being to cover the surface of the ice with a film of half-melted ice or half-frozen water. Such a film, existing between two slabs of ice, would part with heat to both, and would freeze without melting the adjacent ice. This explanation would be satisfactory if the postulate could be granted, but it seems very improbable that there is any such essential difference of temperature between solid and liquid water.

The explanation proposed by Professor J. Thomson is undoubtedly founded on a *vera causa*, but there may be some hesitation in allowing that the cause is adequate to the production of the observed effect in every case. It is certain, however, that it accounts for at least part of the phenomenon. It is founded on his very beautiful theoretical discovery that *the freezing-point of water is lowered by pressure,*

which was experimentally verified by W. Thomson. Hence, if two slabs of ice be pressed together, at the points of greatest pressure the ice will be melted; its latent heat of fusion must be drawn from surrounding bodies, and thus cold is produced which will freeze part of the film of water between the two slabs. The points of greatest pressure will thus be shifted, and the process of melting and regelation may go on indefinitely. Objections to this explanation were advanced by Faraday and Forbes, who shewed that slabs of ice freeze together when suspended vertically with the view of avoiding pressure between them. But J. Thomson shews that the capillary forces of the film of water which must (in these cases) be between the slabs (for without directly applied pressure the effect cannot be obtained with slabs of *dry* ice), are sufficient to produce the pressure requisite for the application of his mode of explanation.

This part of the subject cannot be said to be completely cleared up; but the theory of J. Thomson has been applied with perfect success to the explanation of the very extraordinary phenomena observed in Glaciers (q. v.), where enormous forces are constantly at work. It evidently at once accounts for the result of observation, due to Rendu and Forbes, that a glacier moves like a viscous fluid: in fact, it shews why and how the mass gives way to pressure, and how it is re-frozen in a new form, which in turn gives way to the new distribution of pressure. The explanation of the veined structure, the formation of clear ice from snow, &c., are all easily deduced from it.

The phenomena of regelation are easily seen in the making of snow-balls, which is well known to be impossible, by the hands at least, when the snow has been exposed to great cold, and is therefore dry. But, even in this case, the effect is easily obtained by the application of pressure sufficient to melt the ice, as is well seen in wheel-tracks, &c. By means of a Bramah's press, it is easy to convert a snowball into a sphere of perfectly clear ice.

REGENERATION is a theological expression denoting the spiritual change which passes on all men in becoming Christians. There are various interpretations of the mode and meaning of this change, but its necessity in some shape or another may be said to be admitted by all branches of the Christian Church. By all, man is supposed, as the condition of his becoming truly Christian, to pass from a state of nature to a state of regeneration, from a state in which he obeys the mere impulses of the natural life to a state in which a new and higher—a divine—life has been awakened in him. The words of our Lord to Nicodemus: 'Verily, verily, I say unto thee, except a man be born again, he cannot see the kingdom of God,' are accepted as the expression of this universal necessity by the Christian Church. It may be further stated that every branch of the Catholic Church recognises, although under very different conditions, the Holy Spirit as the author of this change. The change, in its real character, is spiritual, and spiritually induced. According to certain sections of the Christian Church, however, the change is inseparably involved with Christian baptism in all cases; while other sections do not acknowledge any essential connection between baptism and regeneration. In the view of the former, baptism constitutes always a real point of transition from the natural to the spiritual life. The grace of baptism is the grace of regeneration; the laver of baptism is the laver of regeneration, not merely in any formal sense, but in a real and living sense, so that every baptised person—or at least every rightly baptised person—has already become a Christian truly, although he may fall away from the grace that he has received. This is what is commonly called the High Church doctrine of regeneration. In the view of others, regeneration is a special, conscious process, which takes place independently of baptism, or of any other outward fact or ceremony. It implies a sensible experience—an awakening whereby men come to see the evil of sin, and the divine displeasure against sin, and, through the Holy Spirit, are born again, put away their former evil life, and begin to live a new divine life; and many Christians have spoken with rapture of this *experience*, of its thoroughness, its suddenness, its immediateness. There are different shades of opinion on the subject, some holding it as a condition of regeneration, that the regenerate should be able to recount, or at least give some precise idea of the time and manner of the change through which they have passed; others repudiating such views as savouring of fanaticism, yet holding no less to the spiritual definiteness of the change, independently of church forms of any kind; and such views, in contradistinction to the High Church doctrine, have received the name of Evangelical. The idea that regeneration is essentially involved in baptism, or identical with baptism, is supposed by many Christians to be a peculiarly unevangelical idea, opposed to the spirituality and freedom of divine grace.

REGENSBURG or RATISBON (Lat. *Reginum*, *Radespona*), the capital of the Bavarian province of Oberpfalz and Regensburg, is situated on the right bank of the Danube, at the mouth of the Regen, 65 miles north-north-east of Munich. Pop. (1861) 27,875. R., which was formerly a free city of the empire, and the seat of the German Diet, is pleasantly situated in the midst of a broad and fruitful valley, lying 1000 feet above the level of the sea. It presents a strongly-marked medieval character, with its ancient ramparts, fosses, and gates, and its narrow crooked streets, with their high, many-cornered, gabled houses, while it retains many interesting monuments of its importance and wealth during the middle ages. Among its 13 Roman Catholic churches, the most remarkable is the cathedral, begun in 1275, and not completed till the middle of the 17th c., which ranks, since its complete restoration in 1830, as one of the noblest specimens of German architecture, and is especially noteworthy for the fine monuments of its former bishops, and for the silver altar and numerous painted-glass windows, restored in 1830, with which it is adorned. The Church of St James of Scotland dates from the 12th c., and is built in the pure Byzantine style. The old town-hall was used for a century and a half as the place of meeting for the imperial diet. The royal library contains 60,000 volumes. The city has several highly ornamental fountains, and contains a monument to Kepler, who was a native of R., and who made many of his observations there. A stone bridge connects R. with the busy trading suburb of Stadt am Hof. The manufactures of R. include gold, silver, brass, and steel wares, paper, earthenware, beet-root sugar, brandy, and candles and soap of superior quality. Since 1853, it has been a free port; and in addition to ship-building, which is carried on with much activity, the trading community is extensively engaged in the transport of corn, wood, and salt. R., as the principal seat of the Danube Steam-navigation Company, is an especially busy trading port.

R., which ranks as one of the most ancient cities of Germany, and was built by the Romans, by whom it was named *Reginum*, was a place of considerable commercial importance in the early

-ages of Christianity. In the year 750, a bishopric was founded here, which embraced a large portion of Bavaria and the Upper Palatinate. Under the Emperor Frederick I., it was relieved from the subjection under which it had previously stood to the dukes of Bavaria, and declared a free city. During the middle ages, it was the chief seat of the Indo-Levantine trade, and was one of the wealthiest and most populous cities of Southern Germany. From 1663 to the dissolution of the German empire in 1806, R. was, with a very short interregnum, the seat of the German Diet; and after undergoing various changes of fortune during the period of Napoleon's power, was finally ceded to Bavaria, of which it has since formed an integral part.

RE'GENT (Lat. *rego*, I govern), one who exercises the power without having the name of a king. In a hereditary monarchy, there are various circumstances which may necessitate the delegation of the sovereign power—as the devolution of the crown on a minor too young to be intrusted with the kingly office; the incapacity of the sovereign by illness, mental or bodily; and the case of absence from the realm. A regent under the title of Protector (q. v.) has often been appointed to exercise royal authority in the sovereign's minority, the latest instance in England being during the minority of Edward VI.; and regents and councils of regency have been sometimes named by the sovereign to provide for the probable nonage of his heir. According to Coke, the surest way of making such an appointment is by authority of the Great Council in parliament; and in recent times the appointment has generally been made by statute. During the frequent absences of the first two kings of the House of Hanover in their continental dominions, it was the practice to appoint regents or *Lords Justices* (q. v.) to exercise the powers of sovereign. In 1788, when George III. became incapacitated from exercising the kingly office by insanity, it became a question whether his eldest son, then of full age, had a right to be regent, or whether the nomination rested with parliament. The chief political authorities of the time were divided in their judgment, but the king's recovery ended the discussion. On the return of the malady, all parties were unanimous that the regency should be conferred on the Prince of Wales; this was done, however, by parliament, and for the first year of his regency, certain restrictions were imposed, which were to be removed in the case—which eventually occurred—of the king's continued illness.

In 1830, a Regency Bill was passed, providing for the administration of the government, should the crown descend to the Princess Victoria before she attained eighteen years of age; and in 1840, a Regency Bill (3 and 4 Vict. c. 52) was passed, providing that the late Prince Consort should be regent, in the event of the demise of the Queen, her next lineal successor being under age. During her present Majesty's various short absences from the country, there has been no delegation of the royal power.

REGENT OF A UNIVERSITY. In the university of Paris, where this as well as other learned distinctions originated, every Master of Arts possessed the privilege, which he was bound to exercise, of delivering public lectures. The same was the case at first in the universities of Oxford and Cambridge. In process of time, however—about the middle of the 13th c.—the title of Master became a degree attainable by any one after a certain amount of residence, and a certain proficiency, and the duty of lecturing was confined to a limited number of graduates, called *Regents*. The regents were eventually succeeded in the office of lecturing by the established professors. In the English universities, a Master of Arts becomes a regent after a short period, and is supposed to read lectures during the year of his regency. The regents still form the governing body in the Convocation and Congregation at Oxford, and in the Senate of Cambridge. In the Scottish universities, according to their early constitution, the regents were the lecturers; and celibacy was enforced on them down to about the middle of the 17th century.

REGGE'LLO, a small town of Italy, in the province of Florence, and 16 miles east-south-east of the city of that name. It is surrounded by beautiful hills, which produce wines, fruits, and grain in abundance. Pop. 10,207.

RE'GGIO (anciently, *Rhegium Julii*), a seaport in the south of Italy, the chief city of the province of Catanzaro (formerly Calabria Ultra I.), stands on the shore of the Straits of Messina, ten miles south-east of the city of Messina in Sicily. Pop. (1862) of the town proper, 15,692. It is well built; its streets are wide and regular, and it is surrounded by a wall flanked by towers. A fine cathedral, a hospital, and several educational institutions are the principal buildings. Manufactures of linens, stockings, silks, and odoriferous waters, are carried on. The fisheries of the vicinity are profitable, and abound in the Pinna (q. v.), a mollusc, the very delicate skin of which is made into gloves, stockings, and caps of great value. The climate of R. is salubrious, and the scenery of the vicinity exceedingly beautiful; the soil is rich, and produces fruit-bearing plants, both of the temperate and tropical zones, in great variety. Behind the city rises Aspromonte, a mountain of the Apennines, where Garibaldi was wounded in 1862.

The ancient *Rhegium* was founded by the Greeks, was governed wisely and justly by Anaxilas, and afterwards by his sons, 494–461 B. C. It was besieged and destroyed by Dionysius the Elder, rebuilt by Dionysius the Younger, and afterwards united to Rome.

REGGIO, a city of Central Italy, formerly belonging to the duchy of Modena, and now included in the province of that name, stands on the ancient *Via Æmilia*, 16 miles west-north-west of the city of Modena. R. is situated on a fertile plain on the right bank of the Crostolo; is surrounded by a wall; contains beautiful palaces, and a fine cathedral of the 15th c. and other churches, which possess famous paintings; the *Teatro Nuovo*, one of the finest theatres in Italy; the lunatic asylum; a museum, an academy, and many other institutions. It is a rich city, and has manufactures of cotton, of cloth, and of other stuffs. Pop. (1862) of the town proper, 21,174.

RE'GIAM MAJESTA'TEM is the title given to an ancient collection of laws bearing to have been compiled by order of David I., king of Scotland. The authenticity of the work has been controverted, the prevalent opinion being that it is a compilation from the English work of Glanville, called the *Regiam Potestatem*, and that the publication of the book was an artifice of Edward I. to further his design of assimilating the Scotch law to that of England.

REGI'LLUS, LAKE, anciently a small lake of Latium, to the south-east of Rome, somewhere about the foot of the Tusculan hills. If Gell's conjecture as to its situation be correct, it must have occupied an extinct volcanic crater at a place called Cornufelle, near the modern Frascati. Lake R. is celebrated in the semi-legendary history of Rome as the scene (496 B. C.) of a great battle between the Romans, under Aulus Postumius, and the Latins, on

behalf of the banished Tarquin, under O. Mamilius. The latter were entirely defeated, and an end, it is said, was put to the efforts of Tarquin to force his return to the city.

RE'GIMENT, in all modern armies, is a colonel's command, and the largest *permanent* association of soldiers. Regiments may be combined into brigades, brigades into divisions, and divisions into armies; but these combinations are but temporary, while in the regiment the same officers serve continually, and in command of the same body of men. The strength of a regiment may vary greatly even in the same army, as each may comprise any number of battalions. French and Austrian regiments have ordinarily 4 to 6 battalions. Among British infantry, the smallest regiments are those numbered from the 26th upwards (except the 60th), which, unless serving in India, have 1000 men each, composing one battalion. Regiments in India have 1200 men to a battalion. The 60th and Rifle Brigade comprise each 4 battalions and 4000 men. The largest regiment is the Royal Artillery, comprising 34,713 officers and men. The strength of a regiment, however, is changed from time to time; usually by the addition or withdrawal of private soldiers.

The regimental system could only exist where standing armies are maintained. Accordingly, the Macedonian syntagmata and the Roman cohorts were evidently regiments in a strict sense. During the middle ages, feudal organisation precluded the system, and its first reappearance was in France. Francis I. formed legions of 6000 men each, which were divided into independent companies, the latter being, in fact, battalions, and each legion a regiment. The word regiment began to be applied to bodies of British troops in Elizabeth's reign; regiments are spoken of at the time of the Armada, 1588, and as composing the force in Ireland, 1598. From that time forward, the army and militia of Britain have been organised into regiments. Charles I. and the parliament each raised regiments, all of which were disbanded at the Restoration, with the exception of the Lord-general's Regiment of Foot, and his Life Guard of Horse. These two were re-engaged (1661), and form the present Coldstream Guards and Royal Horse Guards. In the same year, a Scotch corps of 1700 men, which had taken service in France in the time of James I., returned to England, and was included in the British army as the 1st Foot. Other regiments of infantry were gradually raised as required. In 1693 was raised the 1st troop of Horse Grenadier Guards, and the 2d troop in 1702. These were disbanded in 1782, and re-formed as the 1st and 2d Life Guards, which still exist. Besides cavalry and infantry, the British army comprises regiments of artillery, engineers, and military train.

The total regiments of the British army for the year 1865—1866 are

		Regiments.	Officers and Men.
Life Guards,		2	880
Horse Guards,		1	440
Cavalry of the Line—			
Dragoon Guards,	7	28	16,833
Dragoons,	3		
Hussars,	13		
Lancers,	5		
Horse Artillery,		1	5,743, in 5 brigades.
Foot Artillery,			28,970, in 23 ″
Royal Engineers,		1	5,028
Military Train,		1	1,817, in 6 battalions.
Foot Guards,		3	5,953, in 7 ″
Infantry of the Line,		110	137,780, in 141 ″
Army Hospital Corps,		1	980
Commissariat Staff Corps,		1	602
West India Regiments (black troops),		4	3,467, in 4 ″
Colonial Corps,		4	4,069, in 4 ″
Total,		157	212,562

Each regiment is nominally commanded by a colonel, who is an old general officer, and whose office is merely a sinecure. The real command rests with the lieutenant-colonel in each battalion, who is assisted by two majors, and has for a staff an adjutant, a quartermaster, a paymaster, a surgeon, and one or two assistant-surgeons, according to the station. The regiment or battalion is divided into companies in infantry and engineers, into troops in the cavalry and the military train. The artillery is divided into 28 brigades, each of which is as large as an ordinary regiment. The brigade is subdivided into batteries. The working officers are captain, lieutenant, ensign to each infantry company; captain, lieutenant, cornet to each cavalry troop; captain, second captain, three lieutenants per battery of artillery.

The following table shews the allotment of the several ranks in each arm:

	Infantry Battalion of 12 Companies.	Cavalry Regiment of 8 Troops.	Field-Artillery Brigade of 8 Batteries.
Officers.			
Staff,	9	10	22
Companies, Troops, or Batteries,	36	24	40
Non-commissioned Officers.			
Staff,	9	11	6
Companies, &c.,	74	48	104
Rank and File.			
Corporals, &c.,	50	32	96
Privates,	750	464	1280
Total,	928	589	1548

It is to be observed that either of the above formations is augmented at once by the addition of privates, without any increase in the officers or non-commissioned officers. The new recruits being distributed among the troops or companies, as many as 300 could be received without sensibly impairing the discipline of the regiment. See Uniform.

REGIME'NTAL SCHOOLS are educational establishments, maintained by the state in every regiment, for the instruction of the soldiers and their children. There is a schoolmaster for the soldiers and elder boys; and a trained schoolmistress—usually the schoolmaster's wife—to teach the girls and infants of both sexes. Attendance at the schools is optional. Religious instruction takes place on Monday mornings, when children can be kept from school if their parents object to the instruction imparted. The girls' school comprises an 'industrial' section for needlework, &c. The charge for regimental schools for the year 1865—1866 is £31,661.

REGIOMONTA'NUS, the name adopted by an early German mathematician, called Johann Müller, probably because he was a native of Königsberg (of which *Regiomontanus* seems intended as a Latin equivalent), where he was born 6th June 1436. Which Königsberg, however, is to be understood, is a disputed point among his biographers, but Delambre and others favour the one in Franconia. R. was sent by his parents to Leipzig at the age of 12, and there made such rapid and extraordinary progress in mathematical studies, that by the time he was 16, he could find nobody, it is said, in the Saxon University competent to give him further instruction. He therefore removed to Vienna, where, in 1461, he became professor of astronomy, but was permitted to reside in Italy for some time, in order to study Greek, with the view of making himself acquainted with the writings of the Alexandrian geometricians and astronomers. He appears while here to have gone through a great amount of laborious work in the collection, collation, and copying

of Greek MSS., in studying the language (under the best masters, such as Theodore Gaza), making astronomical observations, lecturing to the students of Padua on the Arabian philosopher Alfragan, and composing his celebrated work, *De Triangulis Planis et Sphæricis* (first published at Nürnberg, 57 years after his death), which, according to Delambre, gives a very complete account of what was then known of plane and spherical trigonometry. In 1464, R. returned to Vienna, where he remained for some years in the discharge of his duties as professor; but afterwards removed, to Buda, in Hungary, on the invitation of Mathias Corvinus. In 1471, he went to Nurnberg, where he lived in close intimacy with a wealthy and enlightened citizen, named Bernhard Walther, who furnished him, among other things, with means to start a book-printing establishment, and to construct various astronomical instruments, by which they were enabled to demonstrate the inaccuracies of the 'Alphonsine Tables.' Their united labours are to be found in the *Observationes 30 Annorum à J. Regiomontano et B. Walthero* (Nürnberg, 1544). R. now devoted himself vigorously to the composition of scientific works, among others, his *Kalendarium Novum* (ante 1475), which is thought to have been the first almanac that ever appeared in Europe. This last work excited great attention among the learned and powerful of the time, and the first edition was rapidly sold off. The king of Hungary presented R. with a gift of 800 or 1200 golden crowns. Pope Sixtus IV. now sought his assistance in his meditated reformation of the calendar, and to secure his services, conferred on him the dignity of Archbishop of Ratisbon. He now left Nurnberg, and proceeded again to Rome, where, however, he died, 6th July 1476, at the early age of 41. R.'s premature death was a serious loss to the science of mathematics. He is pronounced by competent authorities the most learned astronomer of his age; and his sagacity and ardour were such as to promise important acquisitions to our knowledge of celestial physics. A list of his numerous writings is given by Delambre in the *Biographie Universelle*.

RE'GISTER, LORD, or LORD CLERK REGISTER, a Scottish officer of state who has the custody of the national archives. He was in former times the principal clerk of the kingdom, from whom all other clerks derived their authority. The office used to be held at pleasure, but since 1777 has been conferred for life. The Lord R. is assisted in his duties by a resident deputy.

REGISTER OF ORGAN, a name sometimes given to the sets of pipes or stops of an organ. See ORGAN.

REGISTERS OF VOICE, a term applied to the different kinds of sound distinguishable in the graduated scale of notes produced by any individual voice. Those sounds which, like the ordinary sounds of speech, proceed naturally and freely from the voice, constitute what is called the *chest voice*. By means of a strained contraction of the glottis, notes may be produced of a higher pitch than those of the chest voice; these are called *falsetto* or *head voice*, and have a peculiar flute or flageolet-like quality of their own. Though often sweet and exceedingly pleasing, they cannot be used for a length of time without some amount of constraint or effort, and they are never so powerful, so open, or so impressive as the chest voice. The lower notes, and, in most voices, by far the greater number of notes, belong to the chest voice, the falsetto being only employed in the higher and highest sounds. The sounds produced by the head voice are called the *upper register*, those produced by the chest voice the *lower register*, of the voice; and such notes of the chest voice as may also be produced by the falsetto are said to belong to the *middle register*. In a properly trained voice, the falsetto is so blended with the chest voice that there is no perceptible break between them.

REGISTRATION OF BIRTHS, DEATHS, AND MARRIAGES is an improvement introduced in modern times, and ingrafted on the law and social customs of the United Kingdom for the purpose of keeping an exact account of important facts connected with the population of the country and its social progress. In England, the first act for this purpose was passed in 1836, and a general registry-office was provided in London (at Somerset House) for England and Wales. But even before the new arrangement, there had been long in operation an ecclesiastical mode of registration of marriages, baptisms, and burials in connection with each parish church, the officiating minister being required to keep such a register. By that act, which still retains its force as to baptisms and burials, registers of public and private baptisms, and burials solemnised according to the rites of the Established Church in any parish or chapelry, are to be kept, and entries made, by the minister within seven days at least after the ceremony. These registers are to be transmitted annually to the registrar of the diocese, who keeps the same, and allows inspection on payment of certain fees—severe penalties being incurred by any one who forges or injures the register. This mode of registration was found to be insufficient for statistical purposes, for it was confined only to births and deaths, so far as the ceremonies of the church extended; and hence a systematic plan was instituted in 1836 by the acts 6 and 7 Will. IV. c. 85, 86, which have been since amended by subsequent acts. The head of the office is the Registrar-general. Every poor-law union throughout the country was subdivided into districts for the purposes of the acts. In each district, a registrar, locally resident, is appointed, and a superintendent registrar is put over these.—1. As regards *Births*, it is the duty of the registrar to inform himself of every birth that takes place in his district, and to record the particulars without fee or reward, except such as the act authorises him to take. The forms of the register-books are all settled by the act of parliament, and include a statement of the date of birth, name (if any), sex; name and surname of the father, and name and maiden surname of the mother; rank or profession of the father; signature, description, and residence of the informant; date of registration; signature of registrar; and baptismal name of child, if added after registration. It is not incumbent on the parent or occupier of the house where the child is born to give information; but upon being requested to do so, they are bound, within forty-two days after the birth, to give the particulars touching the birth to the registrar. In case of foundlings, alive or dead, and children born in workhouses, jails, &c., the overseers, coroner, master or jailer respectively, must give such particulars. No fee is payable by the parent, &c., who gives information within the forty-two days. After that period, any person present at the birth, or the father or guardian, may, within six months, make a solemn declaration as to the truth of the particulars, and require the particulars to be registered; but he must pay a fee of 7*s.* 6*d.*, unless the delay was not occasioned by the party's fault. If registration is required to be made after forty-two days, and within six months, except as now stated, the party incurs a penalty of £50. After six months from the birth, the registrar is

not allowed to register the birth under a penalty of £50, unless the child was born at sea.

2. *Marriages.*—With regard to marriages which are performed in the Established Church, every officiating clergyman is required, immediately after the office of matrimony solemnised by him, to register in duplicate the marriage according to a form prescribed by the statute, and one of the duplicates is to be forwarded to the superintendent registrar. The form states the date of marriage; the name and surname of each of the parties; the age as to minority; condition as to previous marriage; rank or profession; residence of each at the time of the marriage; and the name, surname, and rank or profession of the father of each of the parties. Every marriage in England which does not take place in a parish church or chapelry of the Established Church, must take place either in a registered building—and most of the chapels of dissenters are so registered—or in the office of the superintendent-registrar. In the two latter cases, it is necessary that the registrar be present in the registered building at the time, or that the superintendent-registrar be present in his office at the time with witnesses. In such cases, the registrar or superintendent-registrar himself registers the marriage so celebrated.

3. As to *Deaths*, every registrar is required to inform himself carefully of every death within his district, and he is bound to enter the particulars in the form required by statute. The form contains a statement of the date of death, name and surname, sex, age, rank or profession, cause of death, name and residence of the informant, and date of registration. The occupier of the house in which the death occurs, if none of the parties present at the death shall have previously informed the registrar, must, within eight days after the death, on being requested, give such information. Four times every year, the district-registrar sends a certified copy of all the deaths to the superintendent-registrar, and when the book is filled, he sends the book itself. These are sent on, and kept in the General Register-house in London. Besides the registers kept since the passing of the act in 1836, many of the older registers have been collected, and put under the care of the Registrar-general. At the general office in London, indexes are kept of all the certified copies of the registers, and every person is entitled, on payment of a fee, to search them, and have a certified copy. For a general search of all these indexes, a fee of 20*s.* is paid; for a search of a particular index, 1*s.* is paid, and 2*s.* 6*d.* for a certified copy. This certified copy is sealed with the seal of the office, and is evidence in all courts. During the time the register is in the hand of the superintendent-registrar, he is bound also to keep an index, charging a fee of 5*s.* for a general search, and 1*s.* for a particular search.

In Ireland, the system of registration of births, deaths, and marriages was introduced in 1863. By the statute 26 and 27 Vict. c. 11, a statute passed relating to births and deaths, a General Register-office was provided in Dublin, and a registrar-general appointed. The country was subdivided into districts. The provisions of the English act are imitated, except that parents and occupiers of houses are bound to furnish the information of births within three months. A penalty of 20*s.* is incurred by parents, occupiers, or persons present, who neglect to give notice of the births and deaths; but the penalty is not incurred if the omission was accidental or not wilful. By a statute of the same year (26 and 27 Vict. c. 27), the minister neglecting or refusing to register a marriage, is liable to a penalty of £40; and in other cases, the registrar is bound to register it. By 26 and 27 Vict. c. 90, a like provision is made for a general register of marriages.

In Scotland, a system of registration of births, marriages, and deaths was introduced in 1854, by the act 17 and 18 Vict. c. 80. A registrar-general and a registry-office are provided in Edinburgh; the parochial board of each parish appointing the parish registrar, subject to the sheriff altering or combining districts. Similar provisions are made by that act and the subsequent acts of 18 and 19 Vict. c. 29, and 23 and 24 Vict. c. 85. Owing to the difficulty of discovering regular and irregular marriages, detailed provisions are required, and the husband, or, in his default, the wife, is, under a penalty of £10, bound to send the particulars. The details of the Scotch acts secure more accurate statistics than the English acts, particularly as regards illegitimate births.

REGISTRATION OF DEEDS AND WRITS, in the law of Scotland, is an important feature of the administration of the law. The general registration is authorised either by virtue of a clause of registration inserted in a particular deed, or under the old act of parliament of 1698, c. 4, which applies to all probative writs whatever. The clause of registration arose from the practice of churchmen drawing the enforcement of ordinary contracts within their jurisdiction, by causing the parties to consent that the court should, as it were, execute diligence at once if the obligation were not fulfilled. The clause used to be in the form of an authority given to a procurator to go before a judge, and consent to a decree in terms of the obligation; but it is now enough to use this form: 'I consent to the registration hereof for preservation (or for preservation and execution).' Hence, when money is not paid at the time appointed, diligence issues at once on application of the creditor for execution. The practice is now almost universal to insert a clause of registration in deeds stipulating for money payments, especially bonds. When there is a clause of registration, the principal deed is retained in the register, and an attested copy or extract, authenticated by the clerk, and authorising diligence, is given out, and a copy of the deed is entered in a book. When the deed has no clause of registration, it is recorded as a probative writ only, and the principal deed is marked by the clerk, and returned with a certified copy, a copy being also kept in the record. The registration, under authority of a clause of registration is called a registration for execution, and is in effect a short cut to a judgment without the formality of an action, and the registration may take place after the death of the creditor as well as of the debtor. The other registration is usually called a registration for preservation, the object being merely safe custody; but the extract or copy kept in the register is allowed to be evidence in all cases except where there is an action of improbation to reduce the original deed for forgery. The general register is separate from that of deeds containing clauses of registration, and is applicable to all writs of which it is useful to preserve a copy.

Another class of registers has for its object publication to all the lieges, which is effected by allowing inspection to the public, and these writs are those connected with heritable rights, being used by all who lend money on land, or purchase land. There is under this class (1) a register of sasines—i. e., of the final deeds completing the title to property, and vesting it in the owner; (2), a register of entails—i. e., of deeds which perpetuate the enjoyment of land by a specified class of heirs; (3), a register of interdictions—i. e., by which a proprietor of heritage limits his own power of alienation; (4), a register of adjudications—i. e., transfers by operation of law;

(5), a register of inhibitions—i. e., of diligence restraining an owner of land from alienating it to the prejudice of creditors; (6), a register of inventories, by which heirs limit their liability to the amount of their ancestors' assets. By the combined effect of these registers, the state of heritable property, as affected by incumbrances, is displayed to all parties who are interested in ascertaining that fact, and the practice has been found of great benefit to the landowners of Scotland. Besides the general registers for all Scotland, there are also local registers in every county and burgh for similar purposes; some of these local registers remain permanently there, but others are transmitted at intervals, when books or volumes are made up, to the General Register House in Edinburgh. The general result of the Scotch registration system is, that deeds and all other writings may be registered for preservation either in the central register in Edinburgh, or in the provincial registers; that deeds containing clauses of registration with consent of execution, as well as protests of bills of exchange, may be registered for preservation and also for execution in the Books of Council and Session, or in the registers of the subordinate courts; and that all deeds, instruments, and proceedings affecting heritable property must be registered, so that any one can ascertain the burdens affecting it, by inspecting the burgh register as to burgage property, and as regards all other property by inspecting the General Register in Edinburgh, where the whole of the general and particular registers are ultimately concentrated. At the head of the management of these public registers is the Lord Clerk Register, by whom and by his deputy and officers the details of registration are carried out. The General Register House in Edinburgh, in which are collected all these records, was completed in 1787, a general principle of the management being, that the formation of the records is intrusted to one set of officers, and the safe custody of them to another set, so as to provide a better check on the whole process.

RE'GIUM DO'NUM (Lat. royal gift), an annual grant of public money in aid of the maintenance of the Presbyterian ministers in Ireland. It began in 1672, when Charles II. gave £600 of secret-service money to be distributed annually among the Presbyterian clergy in Ireland, on hearing that they had been loyal to him, and had even suffered on his account. The grant was discontinued in the latter part of the reign of that monarch, as well as in the time of James II, but was renewed by William III., who increased it to £1200 a year. It was further augmented in 1723 by George I., in consequence of the Presbyterians having supported the House of Brunswick; raised to £2200 in 1784, and to £5000 in 1792. The amount of the grant for 1863 was £39,746. The ministers who now share in the Regium Donum are those of the Presbyterian Synod of Ulster. Recent applications have been made by these Irish Presbyterians for its increase, but without success. The principle of all gifts of this kind for the support of special religious bodies has lately been the subject of serious discussion in and out of parliament. Several bodies of Irish Protestants object to such gifts.

RE'GIUS PROFESSOR, the name given to the professors in the English universities whose chairs were founded by Henry VIII. In the universities of Scotland, those professors are called Regius Professors the patronage of whose chairs is vested in the crown.

RE'GLET, a flat narrow moulding rising equally on both sides. It is used to separate panels, and to form frets, &c.

REGNAULT, Henri Victor, a distinguished living French chemist and physicist, was born at Aix-la-Chapelle in 1810. While still very young, he was left to provide for himself and his sister, came to Paris, and became a shopman in a bazaar. He made such good use of his scanty leisure, that he qualified himself for admission (in 1830) to the Ecole Polytechnique, and, after the two years' course, came out as a mining engineer. He became a professor in Lyon, whence, in 1840, he was recalled to Paris as a member of the Academy of Sciences, in consequence of some important discoveries in organic chemistry. Having filled chairs in the Ecole Polytechnique and the Collége de France, he became, in 1854, director of the imperial porcelain manufactory at Sèvres.

He is distinguished for extreme skill and patience in experimental work, more than for brilliance or novelty in discovery; and has devoted himself especially to the determination of important physical data, such as the laws of expansion of gases, the measurement of temperature, latent and specific heats, &c. His greatest work is that, undertaken by direction of the French government, on the numerical data bearing on calculations connected with the working of steam-engines, which forms the 21st volume of the *Mémoires de l'Académie des Sciences*. He has also published, in addition to numerous papers in the *Annales de Chimie*, &c., *An Elementary Course of Chemistry* (4 vols. 12mo), a really excellent work.

REGRA'TING. See Engrossing.

RE'GULA, a band under a Triglyph (q. v.) in the Doric style, or the bands between the canals of the triglyphs.

REGULAR CANONS (Lat. *Canonici Regulares*, canons bound by rule), the name given, after the reform introduced into the system of cathedral clergy in the 11th c., to the members of those canonical bodies which adopted that reform. They were thus distinguished from the so-called 'secular canons,' who continued exempt from rule, and who are represented down to modern times by the canons, prebendaries, and other members of cathedral chapters, in those churches, in which the full cathedral system of the Roman Catholic Church is maintained. The rules of the regular canons being variously modified in different countries and ages, a variety of religious orders arose therefrom, Augustinians, Premonstratensians, &c. See Canons, Augustines.

REGULAR PLANE FIGURES are those surfaces whose perimeters are equilateral and equiangular polygons. They are named according to the number of sides which compose the perimeter, being triangles, squares, pentagons, hexagons, &c., according as they have 3, 4, 5, 6, &c. sides respectively; and to all except the *Square* (q. v.) the prefix 'regular' or 'equilateral and equiangular' is applied, to distinguish them from other plane figures which have an equal number of sides, but have not all the sides and angles equal. Circles can be inscribed in and described about all regular figures. See Polygons. *Regular bodies, solids, or polyhedrons* are those solids whose sides are plane figures, all the plane figures being equal, similar and regular. The number of such bodies is necessarily very limited; in fact, no more than *five* such bodies are possible. They are the tetrahedron, hexahedron or *cube*, octahedron, dodecahedron, and icosahedron. The sides or faces of the first, third, and fifth of these solids are equilateral triangles; those of the second are squares; and those of the fourth are regular pentagons. From these five regular solids having been treated of, or described by Plato, they are

generally known as the Platonic bodies, or Plato's five solids.

REGULARS, REGULAR CLERGY (Lat. *regulares*, from *regula*, 'persons bound by rule'), a name used to designate that portion of the clergy, in the Catholic Church, who belong to the monastic orders or religious congregations, and thus live under an established rule, commonly including the three vows of poverty, chastity, and obedience. The name Regular is employed in contradistinction to 'secular,' the term applied to the clergy who are employed in the ordinary parochial duties, or at least who are not withdrawn from liability to such duties, by being subject to any religious rules or constitutions. The name, therefore, comprises all friars, monks, regular canons, clerks of the missions, and, in general, all members of clerical congregations who live under an approved rule.

REGULATIONS, MILITARY AND NAVAL, are the official codes of rules for the guidance of officers in all the cases where uniformity of practice is requisite, and which cannot rightly be left to individual discretion. Regulations may be divided into three classes: viz., those affecting drill, discipline, and finance. Of the first class are such as cavalry regulations, infantry field manual, naval gun drill, &c. Of the second are the Mutiny Act (q. v.), Articles of War (q. v.), and Queen's Regulations (q. v.). The third class are represented by the War-office regulations, purveyors' regulations, explanatory directions for paymasters, navy paymasters' regulations, &c. All these are continually supplemented and altered by circulars.

RE'GULUS. See GOLDEN-CRESTED WREN.

REGULUS, a term in Metallurgy, which is now used in a generic sense for metals in different stages of purity, but which still retain, to a greater or less extent, the impurities they contained in the state of ore. When, for example, the ore known as the sulphuret of copper is smelted, the product of the different furnaces through which it passes is called regulus until it is nearly pure copper. The name, which signifies 'little king,' was first given by the alchemists to the metal antimony, on account of its power to render gold brittle.

REGULUS, MARCUS ATILIUS, a favourite hero with the Roman writers, was consul for the first time 267 B.C., and for his successes against the Sallentini, obtained the honour of a triumph. Chosen consul a second time 256 B.C., he was sent along with his colleague L. Manlius Vulso at the head of a navy of 330 ships (with a land army on board) against the Carthaginians, it being the 9th year of the first Punic War, and encountering the enemy's fleet off Heraclea Minor, he totally defeated it. The Romans then landed near Clypea, where they established their headquarters, and ravaged the surrounding Carthaginian territory with fire and sword, but Manlius being recalled to Rome with one half of the land forces, R. was left to carry on the war with the remainder. For some time he was victorious in every encounter, but at last (255 B.C.) suffered a total defeat; 30,000 Romans were left dead on the field, about 2000 fled and took shelter in Clypea, and R., with 500 more, was taken prisoner. R. remained in captivity for five years, but when fresh reverses induced the Carthaginians to solicit peace, R. was released on parole and sent to Rome in company with the Punic envoys. The rest of his history is one of the most favourite of Roman tales. It is related, *con amore*, by the Roman poets and historians, as an instance and a model of the most supreme heroism, how R. at first refused to enter Rome since he was no longer a citizen; how, after this conscientious scruple was overcome, he declined to give his opinion in the Senate, till that illustrious body laid upon him its commands to do so; how he then earnestly dissuaded them from agreeing to any of the Carthaginian proposals, even to an exchange of prisoners (though no reason appears why such an exchange should not have been effected); and how, after he had succeeded by his earnest appeals, in obtaining the rejection of the Carthaginian offers, he resisted all persuasions to break his parole, though conscious of the fate that awaited him, and, refusing even to see his family, returned with the ambassadors to Carthage, where the rulers, maddened by the failure of their schemes through his instrumentality, put him to death by the most horrible tortures. The common story is, that he was placed in a cask or chest stuck full of nails with the points projecting inwards, and rolled about till he expired; and on the news of this event reaching Rome, retaliations equally atrocious were committed on two of the noblest Carthaginian prisoners. Unfortunately this noble instance of heroic patriotism and unflinching fortitude has not even been noticed by Polybius (about 200 B.C.), who details at great length the other achievements of R.; and Palmerius (Paulmier de Greutesmesnil) and Beaufort, two eminent historical critics, have adduced strong reasons for the story being merely invented for the purpose of excusing the horrible treatment of the captive Carthaginians. Niebuhr roundly declares it to be a forgery, and believes that R. died a natural death; though, excepting the silence of Polybius (which would be utterly unaccountable on the supposition of the mode of his death being the same or similar to what is stated in the common account), there appears to be no reason to doubt the statement in which all the other Roman historians agree, that he was put to death by the Carthaginians.

REGUR, the native name for the cotton-soil of India. It is a rich darkish loam, which has yielded a constant succession of crops—one of cotton, and two of corn—for twenty centuries. It covers extensive level tracts in the southern peninsula, varying from 3 to 20 feet in thickness.

RËI, REE, or **RÉA**, the nominal unit of account in Portugal and Brazil, but no longer existing as a coin; multiples of it, however, still form the authorised coinage in both countries. In Portugal, copper pieces of 5, 10, and 20 (*vintem* = 1*d.* nearly) reis, silver coins equivalent in value to 50, 100 (*testoon*), 200, 480 (*cruzado novo*), 500, and 1000 (*milreis*) reis, and gold pieces of 1000, 2000, 4000 (*moeda douro*), 5000, 6400, 10,000 (gold crown), and 12,800 (*dobra*) reis, are the current coin of the realm; but accounts are kept almost exclusively in milreis and reis. In Brazil, since 1832, no copper coins have been struck; and in that country only silver coins of 500, 1000, and 2000 reis, and gold pieces of 10,000 and 20,000 reis, are coined. The milrei in Brazil is, however, only equivalent to about 2*s.* 3*d.* sterling; while that of Portugal is more than twice this value, the exchange at present being about 4*s.* 9*d.* sterling.

REI'CHENBACH, a flourishing manufacturing town of Saxony, 11 miles south-west of Zwickau. It contains a large cotton-spinning mill, stoneware, and other factories; and produces extensively woollen fabrics, leather, nankeens, lace dresses, damask napkins, waistcoatings, and hosiery. The greater part of the machinery in the town and vicinity is driven by steam. Pop. 9873.

REICHENBACH, a town of Prussian Silesia, on the right bank of the Peilbach, romantically situated at the foot of the Eulen Mountains, 46 miles by railway south-east of Liegnitz. It contains six cotton factories, and carries on linen- and woollen

manufactures, yarn bleaching, dyeing, and printing. Pop. 5769.

REICHENBACH, KARL, BARON VON, a German naturalist and technologist, was born at Stuttgart, the capital of Würtemberg, 12th February 1788, and educated at Tübingen, where he received the degree of Ph.D. Soon after he conceived the project of founding a new German state in the South Sea, but his plans were watched by the French authorities, and being suspected to have some hidden political significance, their author was arrested and imprisoned for some time in the fortress of Hohensperg. On his release he turned his attention to the natural sciences, and their application to the industrial arts, visiting the principal manufactories of Germany and France, and on his return he established at Vilingen and Hansach kilns for the production of wood-charcoal. In 1821, in connection with Hugh, Count of Salm, he commenced a number of manufactories of different kinds at Blansko in Moravia, which were carried on under his own superintendence. R.'s management was so economical and effective, that the concern soon became extremely profitable; and R., after a few years, was the possessor of a handsome fortune, which he invested in the purchase of large estates, including the château of Reisenberg, where he kept his magnificent collection of meteorites; he was about the same time created a baron by the king of Würtemberg. R.'s position as manager of the works at Blansko afforded him valuable opportunities, which were not neglected, for scientific investigation, and the numerous new facts thus brought to light have been of great value to science and art. From the nature of the works, the objects which chiefly presented themselves to his investigation were the compound products of the distillation of organic substances, and by careful analysis he succeeded in bringing to light a number of compounds of carbon and hydrogen not previously known. Among these were creosote (1833), and paraffin (q. v.). In later years he launched out into speculations of a wholly different character. Studying with enthusiasm the subject of animal magnetism, he discovered, as he thought, a new force in nature. See OD. His chief literary works are, *Geologische Mittheilungen aus Mähren* (Vienna, 1834), the first geological monograph published in Austria; *Physikalisch-physiologische Untersuchungen über die dynamide des Magnetismus und der Electricität, und ihre Beziehungen mit der Lebenskraft* (Brunswick, 1847—1849); several other works on 'odic force,' published at Stuttgart between 1852 and 1856; and in the *Neues Jahrbuch der Chemie und Physik* may be found several papers by R., in which he describes his various chemical discoveries; he also wrote the *Kohlerglaube und Afterwissenschaft* (1856), in reply to a work of Karl Vogt.

REICHENBERG, after Prague the largest town in the kingdom of Bohemia, stands in the middle of the most populous and industrious district of the Austrian monarchy, in a romantic valley on the Neisse, 52 miles north-north-east of Prague. Linen, cotton, and woollen fabrics are manufactured extensively, as well as fire-arms, hats, leather, shoes, gold and silver wares, musical instruments, &c. The annual value of the goods manufactured at R. is estimated at over £400,000. Pop. 18,000.

REICHENHALL, a small town of Bavaria, on the Saal, 8 miles south-west of Salzburg. It was almost wholly consumed by fire in 1834, and has been handsomely rebuilt since that time. It is the centre of the Bavarian salt-works, and in the manufacture of salt, its inhabitants—about 3000 in number—are for the most part employed. Of its 18 salt-springs, which burst forth about 50 feet below the surface of the ground, and to which a spacious shaft has been sunk, some are so strong in the brine as to be fit for boiling at once; but generally speaking, they are subjected to a preliminary evaporating process. The strongest and most abundant spring, containing 24 per cent. of salt, and yielding 3300 cubic feet of water every 24 hours, is perhaps the most copious salt-spring in the world. From it alone about 200,000 cwts. of salt are obtained annually. A brine conduit, 60 miles in length, conveys the water of salt-springs from Berchtesgaden, through R., over mountains nearly 2000 feet high, to Traunstein and Rosenheim, in the vicinity of which abundant timber for fuel is procurable.

REICHSTADT, NAPOLEON, FRANÇOIS CHARLES JOSEPH, DUKE OF, described by the Bonapartists as NAPOLEON II., was the son of the first Napoleon by Maria Louisa of Austria, and was born at Paris, 20th March 1811. His father's joy at his birth was unbounded. '*C'est un roi de Rome*,' he cried to the crowd of congratulators who pressed into his apartments on hearing the news. The infant prince was baptised on the 9th of June in the cathedral of Notre Dame by Cardinal Fesch. After the reverses of 1814, Napoleon, it will be remembered, abdicated in favour of his son, but the Senate took no notice of Napoleon II., and called Louis XVIII. to occupy the French throne; whereupon Maria Louisa and her child removed to the palace of Schönbrunn, near Vienna, where they remained till the treaty of Vienna had rearranged the affairs of Europe. Maria Louisa then proceeded to take possession of the sovereign duchy of Parma, which had been conferred upon her, while her son continued to reside at the Austrian court with his grandfather Franz I., who was much attached to him. By an imperial patent, dated 22d July 1818, he was created Duke of R., with the rank of an Austrian prince, and received a liberal education, but never enjoyed robust health, nor exhibited a vigorous intelligence. At the July revolution in 1830, his name was mentioned as a candidate for the French throne, and Talleyrand, it is even believed, proceeded to Vienna for the purpose of advocating his cause, but was coldly received, and the project dropped. Destiny had indeed determined otherwise. The constitution of the poor youth was utterly undermined by laryngeal phthisis, and on the 22d July 1832 he expired at Schönbrunn. His last words, addressed to his mother, were very touching as an expression of almost childish despair, '*Ich gehe unter, meine Mutter, meine Mutter!*' He was interred with magnificent pomp in the imperial tomb at Vienna.

REID, THOMAS, was born on the 26th April 1710, at Strachan, a country parish in Kincardineshire, where his father was minister. His mother belonged to the well-known family of the Gregories (q. v.). R. began his education at the parish-school of Kincardine, and at the age of 12 he became a student of Marischal College in Aberdeen. His master in philosophy was Dr G. Turnbull, one of the earliest representatives of the properly Scottish school. He took his degree of M.A. in 1726, and continued to reside in Aberdeen as college librarian, his chief studies being mathematics and the philosophy of Newton. In 1736, he left Aberdeen, and went, in company with a friend, to England, where he was introduced to the most distinguished men in Oxford, Cambridge, and London. In the following year, he was presented by the senatus of King's College to the parish-church of New Machar in Aberdeenshire. The parishioners were bitterly opposed to his appointment, but his conduct and manner gradually won them over. It is said that, from distrust of

his powers, instead of composing for the pulpit himself, he preached the sermons of the English divines Tillotson and Evans. In 1740, he was married to a cousin of his own, who greatly aided him in the work of his parish. In 1739, Hume's *Treatise on Human Nature* appeared; the perusal of which gave the impulse that determined his future philosophical career. He had fully adopted the idealism of Berkeley, but was now revolted by the conclusions drawn from it by Hume, and in consequence was led to seek a new foundation for the common notions as to a material world. In 1748, he contributed to the Royal Society of London a short essay on *Quantity*, occasioned by what he considered an abusive application, by Hutcheson, of the forms of mathematical reasoning to ethics. In 1752, he was appointed one of the professors of philosophy in King's College, Aberdeen, the senatus being the patrons of the chair. Here he followed the established course of teaching in three successive years to the same students, mathematics, natural philosophy, and moral philosophy. He took an active part in all the business of the university. He was also the founder of a Literary Society in Aberdeen, which enrolled among its members, Campbell, Beattie, Gerrard, and other men of ability; to this society he submitted his first draft of the *Inquiry into the Human Mind.* In 1763, he was chosen to succeed Adam Smith as professor of moral philosophy in the university of Glasgow. He was now rescued from the necessity of teaching physical science, and devoted himself thenceforth to metaphysical and mental speculation. In 1764, he published his *Inquiry.* His thirst for general science never left him; at the age of 55, he attended Black's lectures on Heat. He continued in the duties of his chair till 1781, when he retired to devote his remaining strength to the publication of his works on the mind. In 1785, the *Philosophy of the Intellectual Powers* appeared; and in 1788, the *Active Powers.* These treatises must always be looked upon as constituting the first complete and systematic work on the science of the human mind. In 1774, he had contributed his account of Aristotle's logic to Lord Kames's *Sketches.* The publication of the *Active Powers* was the close of his career as an author, although to the end of his life he kept up his bodily and mental vigour, and his interest in science. His only surviving daughter had married the son of Gershom Carmichael (the real founder of the Scottish school of philosophy); she it was that, after the death of his wife in 1792, cared for him in his last years. He was taken ill suddenly in the autumn of 1796, and died on the 7th October. He was under the middle size, but had great muscular strength, and was addicted to exercise in the open air.

R. had many points of resemblance to his great contemporary Kant. Both were occupied up to middle life with mathematical and physical studies; both were roused to metaphysical research by Hume, and each became in his own country the chief of a school whose aim was to deliver philosophy from scepticism, and to do so by resting finally on principles of intuitive, or *à-priori* origin.

R.'s refutation of Berkeley, notwithstanding the powerful support of Hamilton, is now considered by many to be a failure. His own account of the motives that led him to abandon Idealism, proves that he completely misconceived the real drift of that famous speculation.

REI'GATE, a parliamentary borough and thriving market-town of Surrey, pleasantly situated at the southern base of the North Downs, 23 miles south of London by the South-eastern Railway. From very early times, it was considered a place of strength; and after the Conquest, it was granted to the Earls of Warrenne. Of the castle built by these earls, only very slight vestiges remain; but beneath the site are several large vaults or caverns, excavated in the sandstone not earlier than the 13th century. The church is in various styles of architecture—the oldest portions dating from the 12th century. Under its chancel is buried Charles Howard, Earl of Effingham, Elizabeth's Lord High Admiral, and the conqueror of the Spanish Armada. One member is returned to parliament for the borough. Pop. in 1851, 4927: in 1861, 9975.

REIGN OF TERROR, the name given to that period in the history of France when the revolutionary government, under the guidance of Maximilien Robespierre, supported itself by the pure operation of terror, exterminating with the guillotine all the enemies, or supposed enemies, of the democratic dictatorship. In the year 1793, the Convention vested the government in a 'Committee of Public Safety,' a body belonging to the party of the Mountain, and of which Robespierre, Couthon, and St Just became the triumvirate. This Committee, to which every other authority in the country was subjected, deliberated in secret, and the Convention sanctioned all its decrees. Louis XVI. had already been brought to the scaffold; and on October 16, his queen, Marie Antoinette, after being subjected to every possible indignity, was beheaded; the Princess Elizabeth sharing the same fate on 10th May 1794. The execution of the Girondists (q. v.) followed, and that of the Duke of Orleans. The guillotine became the only instrument of government: a look or a gesture might excite suspicion, and suspicion was death. The Calendar was remodelled, and all religious rites suppressed. When the power of the Committee had attained its climax, a decree was passed abrogating every delay or usage calculated to protect an accused person; but from that moment a reaction began. A section of the Mountain party were satiated with blood, and had become impatient of the control of Robespierre. On July 28, 1794, he was denounced in the Convention for his barbarities, and his death (see ROBESPIERRE) brought to a close this sanguinary era in French history.

REI'KIAVIK. See ICELAND.

REIMARUS, HERMANN SAMUEL, a German philologist of high eminence, was born in 1694 at Hamburg, where his father was Professor at the Johanneum Gymnasium. He visited the universities at Jena and Wittenberg, travelled afterwards in Holland and England, and was, on his return, elected Rector at Wismar, and subsequently Professor of Hebrew and Mathematics at the gymnasium of Hamburg. He died there in 1765. He is the author of the so-called 'Wolfenbüttelsche Fragmente eines Unbekannten,' first published by Lessing in his *Beiträge zur Geschichte und Literatur aus den Schätzen den Wolfenbüttelschen Bibliothek.* These 'Fragmente,' up to that time only known in MS. by a few of R.'s most intimate friends, produced the profoundest sensation throughout Germany: since in them, the author, in the boldest and most trenchant manner, denied the supernatural origin of Christianity. Another work, in the same direction, is his *Vornehmste Wahrheiten der Natürlichen Religion;* of a miscellaneous character are his *Primitia Wismariensia, De Vita Fabricii, Dissertatio de Assessoribus Synedrii Magni,* &c. His edition of *Dio Cassius* is one of the most valuable contributions to classical philology.

REINDEER (*Cervus tarandus* or *Tarandus rangifer*), a species of Deer (q. v.), a native chiefly of the arctic regions; by far the most valuable and

important of all the species of deer, and the only one which has been thoroughly domesticated and brought into service by man. It is found wild in Europe, Asia, and America, in Spitzbergen, and in Greenland. It is not, however, a native of Iceland, but was introduced into that island by Governor Thodal in 1770, and soon became thoroughly naturalised; great herds now roaming over the wildest parts of the interior, but approached with difficulty



Reindeer (*Cervus tarandus*).

by the hunter, and of little value to the inhabitants. It is not there known as a domestic animal. The R. attains its greatest size in the arctic regions; and in Western Europe it is not found very far to the south of the arctic circle; but in Siberia and in America its range extends much further to the south, almost to the latitude of Quebec in America; and in the west of Asia, along the whole chain of the Ural Mountains, and even to the south of Astrakhan, almost to the Caucasus.

The wild R. of Lapland is almost equal in size to the stag, but there are great differences of size in different districts, the largest size being generally attained in very polar regions. The domesticated R. is never so large as the largest wild ones; but the domesticated R. of Siberia is, like the wild one, much larger than that of Lapland. The R. is very inferior in gracefulness to the stag, and, indeed, to most species of deer, being of a rather heavy appearance, with comparatively short and stout limbs, the withers much elevated as in the elk, and the neck carried almost straight forward. The tail is very short. There is little or no mane, but the hair of the lower parts of the neck is very long and shaggy. Both sexes have large horns, those of the male being larger, and often more than four feet long. They are slender and cylindrical almost to the tip in young animals, but in old ones become palmated there, although still slender and cylindrical at the base; they are more or less branched, and from the base spring one or two branches, comparatively short, but also in old animals much palmated, so that the armature of the head is of a very peculiar appearance. The R. is said to use its horns to remove the snow from the lichens which form great part of its winter food; it also scrapes up the snow with its feet and turns it up with its snout; and by a beautiful provision of nature, the feet, forehead, and nose are protected by a remarkably hard skin. The R. is gregarious, partially migratory—its migrations, however, not being regulated by climate, but by the facility of obtaining food. To the Laplander the R. constitutes the chief part of his wealth; and many Laplanders possess herds of 2000 and upwards, which they feed chiefly in the mountainous tracts in summer, and in the lower grounds in winter. The flesh is excellent, as is also the milk, which is much used. The skins are used for clothing, tents, and bedding. The hard skin of the face and feet is much valued by the Laplanders for making shoes. The R. is also extremely valuable as a beast of draught, for which purpose it is harnessed to sledges. It is capable of maintaining a speed of nine or ten miles an hour for a long time, and can easily draw a weight of almost 200 lbs. besides the sledge. It is much employed for this purpose in Siberia as well as in Lapland; but in America, it is merely an object of chase, valued for its flesh, fat, and hide. Among other methods resorted to by the Esquimaux and other Indians for its capture is that of making pits in the snow, covered with a slab of ice, which revolves on its own centre when the R. sets foot on it. The flesh and fat are made into Pemmican (q. v.), besides being used in a fresh state. A very thick layer of fat lies under the skin of the back of the male. The American R. is called the CARIBOU, and is sometimes regarded as a distinct variety, but the differences are very slight. Although the R. has been found to live for years when brought to Britain, the climate does not seem suitable to it.

The R. suffers grievously during summer from the attacks of various kinds of insects, and particularly of a species of Bot (q. v.), which is sometimes not merely tormenting but destructive.

REINDEER MOSS (*Cenomyce rangiferina* or *Cladonia rangiferina*), a lichen of great importance to the Laplanders and other inhabitants of the northernmost regions of Europe and Asia, as forming the chief winter food of the reindeer. It is found in almost all parts of the world, but is most abundant and luxuriant in the arctic regions. It is common in Britain, growing in moors and on mountains. It covers extensive tracts in Lapland and other very northern countries, making them even in summer as white as snow, and often thus occupies the ground in pine forests. When pine forests are destroyed by fire, it soon springs up in its greatest luxuriance. It is a very variable plant, but always consists of a much-branched erect cylindrical tubular thallus, with small perforations in the axils. It attains a height of two inches and upwards. The branches of plants which grow together usually mix very intricately into one mass. The importance of this lichen was first brought into notice by Linnæus in a beautiful passage of his *Flora Lapponica*. The reindeer reach it by scraping with their feet, even when it is covered with very deep snow. It is capable of being used for human food, and was recommended for this purpose in times of dearth by an edict of Gustavus III. of Sweden. Its taste is pleasant, although attended with a slight pungency or acridity. It is generally boiled in reindeer milk. Its nutritious qualities depend chiefly on the Lichenin (q. v.) which it contains.

REINFO'RCE, FIRST and SECOND, in Guns, are the two sections of the length which come next the breech. The gun is made thicker at these parts, so as to resist more effectually the explosive action of the powder. The thickness of metal is less at the second reinforce than at the first, the powder being considered to have already exerted its greatest disruptive force. This conclusion is, however, open to dispute. The first and second reinforce are shewn (with their reinforce rings) at AC, CD in the figure under GUN.

REIS EFFE'NDI, the title of one of the chief officers of state in the Ottoman empire. He is the Chancellor of the empire, and Minister of Foreign

Affairs. His duty in the first-mentioned capacity is to confer with the grand-vizier regarding the orders and instructions to be sent to the different provinces, and regarding the proper decision on any subject affecting the empire, whether internal or external; and in the latter capacity, he has the sole and exclusive charge of the relations of the Porte with foreign courts.

REJOI'NDER, in English law, means the pleading of a defendant in answer to a plaintiff's replication. The order of pleading is declaration, plea, replication, rejoinder, surrejoinder, rebutter, surrebutter, &c.—each party alternately delivering one of these pleadings.

RELA'PSING FEVER is one of the three great species of continued fever common in this country, the two others being typhus and typhoid. Although the disease has been accurately described by several physicians during the last century (since 1739), its present name was given to it only about 1850 by Dr Jenner. It had previously been vaguely known under the various names of *five-day fever, seven-day fever, mild yellow fever, short fever, short relapsing fever*, &c., and has often been confounded with common continued fever. It has attracted special notice since 1843—1844, when there was prevalent in Scotland 'an epidemic fever characterised by the suddenness of its onset, its wide diffusion, its short duration, and its small mortality; by its proneness to relapses, by the frequent occurrence of petechiæ, of something like black vomit, and of yellowness of the skin; by the absence of intestinal ulcers; and by profuse sweatings, whereby the fever seemed to be solved.' This fever was supposed at the time by Alison and other eminent physicians who described it, to have been a new and hitherto unknown pestilence; but Jenner's subsequent researches shewed, as has been already mentioned, that in this respect they were in error; epidemics of this kind having previously occurred in Scotland or Ireland (or both simultaneously) in 1736, 1739—1741, 1800—1801, and 1816—1820.

Relapsing fever usually begins suddenly with rigors, a sense of chilliness and frontal headache. Febrile reaction soon sets in; the tongue is coated with a thick moist whitish fur; and the skin is often so yellow as to approach to jaundice (a phenomenon that never occurs in typhus or typhoid fever). By the fifth or sixth day, there is usually delirium. After the above-described symptoms have lasted for a period varying from five to eight days, generally on the seventh day, a sudden change takes place. This change commences with a copious perspiration, which is followed by a rapid falling of the pulse to its healthy rate (or even lower), and the patient appears nearly well. But from the fifth to the eighth day of this seeming convalescence, a sudden relapse occurs, and all the primary symptoms return; these run a rather shorter course than before, and again terminate in sweating and in a second convalescence, which is in most cases permanent. The relapse sometimes, however, occurs three or even four times.

Death is a rare termination of relapsing fever; and when it does occur, it is usually before the seventh day of the disease. No special anatomical lesion is observed in the bodies of those who succumb to this disease, but enlargement of the spleen is by no means uncommon.

The treatment to be adopted is simple. The bowels should be opened at the commencement of the attack by calomel and rhubarb, and if necessary, kept open subsequently with castor-oil or saline aperients. The headache must be encountered by leeches or cupping, if the patient is robust; and by blisters or dry cupping, if he cannot bear the loss of blood. The vomiting is often hard to check: if effervescing draughts fail, it may sometimes be combated by calomel and opium combined in pills.

Its cause is unknown, but it mainly attacks the poor and the ill-housed and ill-fed. Its poison appears to be a specific kind; the phenomena of the fever are very different from those of typhus and typhoid fevers; and patients recovering from these diseases may catch, by contagion, this disease, while patients convalescent from this fever may take typhus or typhoid fever. It has been supposed by some physicians to be allied to yellow fever, but it seems more nearly to resemble some form of Remittent Fever (q. v.), on account of the repetition of the rigors after a regular daily period of from two or three days.

RE'LATIVE KEYS, in Music, the keys most nearly related to any key whose scales have the greater number of their notes in common with it. The keys which are most nearly related to a major key, taken as principal, and into which it may most easily pass, are its *dominant*, or fifth above; its *subdominant*, or fifth below—each of which differs from it by only one sharp or one flat—and its *relative minor* key, that is, the key which has the same signature, is in its descending scale the same, the ascending scale differing by two notes. In the same way, the keys most nearly related to a minor key are its *dominant* and *subdominant*, and its *relative major*. Thus the relative keys of C major, as principal key, are G major, F major, and A minor; and the relative keys of A minor are E minor, D minor, and C major. A more remote degree of relationship subsists between a major key and the dominant and subdominant of its relative minor, or between a minor key, and the dominant and subdominant of its relative major. A major key is also closely connected with its tonic minor, or the minor key of the same tonic, as the two keys have the tonic, dominant, and subdominant in common.

RELATIVE PRONOUNS differ from personal and other Pronouns (q. v.) in this, that, besides standing for nouns, they at the same time have the power of conjunctions. They join sentences or clauses by *relating*, or referring back directly, to something just named. The relatives in English are *who*, *which*, and *that*. *What* is used for *that which*, thus embracing both relative and antecedent. In many cases, *who* or *which* can be resolved into a conjunction and a personal pronoun. Ex. 'At last the surgeon was called in, *who* (= *and he*) straightway amputated the limb.' 'Why consult Charles, who (= *for*, or *since he*) knows nothing of the matter?' 'Ahab seized the vineyard of Naboth, *which* (= *although—it*) he had no title to.' In cases where they are not thus resolvable, they introduce sentences or clauses to limit nouns, the relative clause serving the purpose of an adjective. Ex. 'He picked out all the men *who had blue eyes*' (= *the blue-eyed*). 'The house *which stands* (= *situated*) half-way up the hill is the most cheerful.'

Who is employed when the reference is to persons, and *which* when it is to inferior animals or things. *That* is applied to both persons and things; but it does not follow that it may be used at pleasure instead of *who* or *which*. Whenever a *who* or *which* is resolvable as above described, the substitution of *that* would alter the meaning; in the last, e. g., of the three examples given, it would make the sentence declare that Ahab seized the particular one of Naboth's vineyards to which he had not a title; implying that he had a title to some other vineyard or vineyards of Naboth. It is only when the purpose of the relative clause is to limit or define the

thing meant, that *that* is ever applied; and for this purpose, its use is in general preferable to that of *who* or *which*. It is easier and more idiomatic to say: 'All the men that had blue eyes,' than, 'All the men *who*,' &c.; and who would think of saying: 'This is the house *which* Jack built?' Besides, *that* so employed often avoids ambiguities that would attend *who* or *which*. Ex. 'His conduct surprised his English friends, *who* had not known him long.' This may mean either that his English friends generally were surprised, for the reason that they had not known him long; or that only a portion of them—those, namely, that had not known him long—were offended. If the latter is the meaning intended, it would remove all ambiguity to write: 'His English friends *that* had not known him long.'

The use of the demonstrative *that* as a relative is common to the Teutonic languages, but is unknown in Greek, and Latin, and in the Romanic languages. The relatives proper (and the many derivatives and compounds formed from them) in all the allied languages begin with *k*, or an equivalent of *k* (*qr*, *hr*, *hw* = *wh*, *w*, *h*). Sans. *kas*, Gr. *kōs* or *pōs* (how), Lat. *quis*, *qui*, Pol. *kto*, Goth. *hvas*, Ger. *wer*, Dan. *hvi* (pron. *vi*), Eng. *who*, *how*, Fr. *qui*, It. *chi*.

The relatives proper are also used (sometimes with a slight variation of form) to ask questions, when they are called Interrogatives.

RELATIVE RANK, in the Army and Navy, signifies the precedence which certain non-combatant officers and others are entitled to take among their combatant brethren; for instance, a commissary-general has the relative rank of major-general, a naval surgeon that of a naval lieutenant, &c. Relative rank carries with it all precedence and advantages attaching to the military rank with which it corresponds, and regulates rates of lodging money, number of servants, rations of fuel and light (or allowances in their stead), detention, and prize-money. Relative rank does not entitle the holder to salutes from ships or fortresses, nor to the turning out of guards.

The relative rank of the several civil departments is stated under their respective headings; see MEDICAL DEPARTMENT, PURVEYORS, &c. It only remains to shew the relative rank of the army and navy:

Navy.		*Army.*
Admiral of the Fleet . .	ranks with	Field marshal.*
Admirals . .	rank "	Generals.*
Vice-admirals . . .	" "	Lieut. generals *
Rear-admirals . .	" "	Major-generals *
Captains of the Fleet / Commodores, 1st and 2d class .	" "	Brig.-generals.*
Captains over 3 years' service .	" "	Colonels.*
Captains under 3 years' service	" "	Lieut.-colonels *
Commanders . . .	" "	Lieut.-colonels †
Lieutenants of 8 years' standing	" "	Majors *
Lieutenants under 8 years' standing	" "	Captains.*
Sub-lieutenants . . .	" "	Lieutenants.*
Midshipmen . . .	" "	Ensigns.'

RELEA'SE, in English Law, is a discharge of some interest in land, or of some legal right. Thus, where one who is the owner of land gives or transfers his right to another, who has some prior estate in possession, the deed by which this is done is a release. Formerly, it was usual for A to give a lease of land to B, and next day to give a release conveying the rest of the estate to B. The term 'release' is also used as a discharge of all demands or rights of action in reference to a particular matter.

RE'LEVANCY, in Scotch Law, means the condition of a plea which is well founded in point of law, provided it be true in fact. An objection to the relevancy corresponds in many respects to a demurrer in English law.

RE'LICS (Gr. *leipsana*, Lat. *reliquiæ*, remains), the name given in theological and historical nomenclature to what may be in general described as the personal memorials of those among the dead who have been distinguished during life by eminent qualities, especially by sanctity or by remarkable religious services. Under the same name are classed certain objects which are believed to be memorials of the life of our Lord upon earth, and especially of his passion and death. Such memorials of the distinguished dead have at all times and in all states of society, however rude, been held in honour among men. But the question as to relics is chiefly important in relation to Christian history, in which the name is restricted to a single class of memorials, viz., to objects which derive their value from their connection with our Lord and with the saints; as, for example, fragments of our Lord's cross or crown of thorns, portions of the dust, the bones, the blood, the instruments of torture, the chains, &c., of the martyrs, the mortal remains, the clothes, the books, and other objects of personal use of the other saints, and even objects to which a certain indirect sacred interest is given by their being brought into contact with the direct memorials of the distinguished dead, as by their being placed on the tombs of the martyrs, touched with the relics, or blessed at the shrine or sanctuary of the saints, &c. In all such cases, the motive of religious honour, however differently it arises, is precisely the same, viz., the association of the object which is honoured with the personage whose virtues or services are the subject of grateful veneration. The merits of relics, in their theological aspect, are beyond the scope of this publication. We shall confine ourselves to an outline of the history of the veneration of relics, and to an explanation of the conflicting views of the rival Christian communions on the subject.

The very earliest monuments of Christian history contain evidences of the deep and reverential affection with which martyrs of the faith, their mortal remains, and everything connected with their martyrdom, were regarded by their fellow-Christians, and for which Catholics profess to find warrant in many passages of the Old and of the New Testament, as Ex. xiii. 19; Deut. xxxiv. 6; 2 Kings xiii. 21, and xxiii. 16—18; Isaiah xi. 10; Matt. ix. 20—22; Acts v. 12—16, and xix. 11, 12. The contemporary letter of the Church of Smyrna attests this plainly as to the martyrdom of Polycarp; Pontian's *Life of Cyprian* tells of their stealing the martyr's body, and carrying it away by night in holy triumph with lights and torches. At an early period, too, miracles are described as connected with relics. Thus Ambrose (Ep. xxii. 1, 2) tells of a blind man's sight restored by his touching the bodies of the martyrs Gervasius and Protasius; and similar wonders are detailed by Gregory Nazianzen (*Orat.* xviii.), Chrysostom (*In S. Ignatium*, n. 5), Leo the Great (*Serm.* iv. 4); insomuch that the possession of relics of the martyrs, and even the occasional touching of them, was regarded as a special happiness (Gregory Naz. *Orat. in S. Theodorum*), and that not merely individuals, but, according to Theodoret the historian, even cities were content to share with each other portions of the sacred treasure (Theodoret, *Græc. Affectionum Curatio*, disp. viii.). Connected with this feeling, too, is found a belief of a certain sacred efficacy in the presence or the touch of the relics, and especially there is ascribed by Chrysostom, Basil, Theodoret, and other Fathers, to prayers offered before the relics, a virtue in dispelling or warding off sickness, diabolical machinations,

* According to date of commission.
† Junior of the rank.

and other evils. Hence we find that altars were erected over the tombs of the martyrs, or at least that relics were invariably placed on the altars, wherever erected, insomuch that the Trullan Council ordered the demolition of all altars in which no relics had been deposited. Far more sacred than the relics of martyrs, was the cross of our Lord, which was believed to have been discovered at Jerusalem by Helena (q. v.), mother of the Emperor Constantine. Minute portions of the wood were distributed to the principal churches; and Cyril of Jerusalem, within less than a century after the discovery of the cross, describes the precious wood as dispersed throughout the world. It must be added, too, that even at this early period, many abuses and superstitious had crept in, which even the Fathers who admit the worship do not fail to condemn.

The practice of relic-worship, however, and the feeling on which it was founded, were not suffered to pass without a protest. Vigilantius, in a treatise which is now lost, but the tenor of which is learned from his adversary, Jerome, reprobated in the strongest terms the excesses to which it was carried, and indeed the essential principles on which the practice rests. But the protest fell without drawing an echo from the contemporary mind. Vigilantius had so few followers, that were it not for the refutation of his work against relics composed by Jerome, we should have no record of his opposition to the popular view; and it is urged by Catholics, as a proof of the universal acquiescence of the church of the 4th c. in the practice of relic-worship, that in an age remarkable for intellectual activity and for polemical ardour—an age which in 25 years saw nearly 30 councils in the cause of the Pelagian heresy—it was not even found necessary to call a single council to condemn Vigilantius.

The writings of Augustine, of Paulinus of Nola, of Ephrem the Syrian, of Gregory the Great, and others, are full of examples of the miraculous virtue ascribed to relics, and of the variety and the extensive multiplication of sacred memorials of all kinds. Nor was this confined to the orthodox alone; all the different parties in the controversy on the Incarnation agreed with Catholics and with one another on this subject, and even the Iconoclasts, at the very time that they most fiercely repudiated the use of images, admitted without difficulty the veneration of relics.

In the age of the Crusades, a fresh impulse was given to the worship of relics in the West, by the novelty and variety of the sacred objects brought home from the churches of Syria, Asia Minor, and Constantinople by crusaders, by palmers returning from Palestine, and by the Latin conquerors of Constantinople; and it is admitted by the most zealous Catholics, that at this period many false, and perhaps even absurd and ridiculous relics were introduced, and were successfully commended to the veneration of individuals or individual churches in the West; nor do they venture to doubt that abuse and superstition found their way side by side with what they regard as the genuine and authorised worship of the church. Nevertheless, with the exception of the Waldenses, Wycliffe, and a few isolated individuals, the practice remained unchallenged till the 16th c., when, in common with many other doctrines and practices of the church of Rome, it was utterly repudiated by the Reformers. Catholics, however, allege that the practice, as sanctioned by the church, has nothing in common with the abuses which form the main ground of the objections alleged by Protestants. The Roman Catholic use of relics, as authorised by the church, is to serve as incentives to faith and piety, by recalling vividly to men's minds the lives, and, as it were, the corporeal presence and the earthly converse of the saints, and thus placing before them, in a more touching manner, the virtues which, in the examples, are held up for men's imitation. The decree of the Council of Trent connects the subject of relic-worship with the general question of saint-worship, and regards the relics of the saints not as possessing intrinsic virtue, but only as instruments 'through which God bestows benefits on men.' See INVOCATION OF SAINTS.

The Greek and other oriental churches, and most of the oriental sects, agree with Roman Catholics in the practice of relic-worship. On the contrary, the Reformed churches, without exception, have rejected the usage as unscriptural, calculated to withdraw from the worship of the one God, and deformed by numerous superstitions. They regard a large proportion of the relics which Roman Catholics worship as false and supposititious, and they specify several, regarding the spuriousness of which even learned Catholics appear to be satisfied. Some relics have been the subject of much controversy among Roman Catholics themselves. See HOLY COAT, HOLY PLACES, LORETTO, PILGRIM. It may be added that the practice of relic-worship forms a notable feature of the Mohammedan usage of pilgrimages. The holy cities of Mecca and Medina, and the celebrated Mosque of Omar at Jerusalem, owe most of their holiness in Mohammedan eyes, to the memorials of the Prophet, and other relics which they contain; and the celebrated *Sanjak-sherif* or Sacred Standard at Constantinople, is believed to be formed of the nether garment of Mohammed. The practice occupies a still more important place in Buddhism (q. v.—see also CEYLON).

RELIEF, in English law, means a payment by a tenant or vassal to a lord, the theory being, according to feudal law, that relief (*relevium*, Lat. *relevare*) is a restoration of the lands after the wardship or guardianship of the lord has ceased, and the vassal has attained majority.—Relief is also the common term used among the poor and among parochial officers to denote the pecuniary assistance given under the poor-laws to a pauper. See RELIEVING OFFICER.

RELIEVING OFFICER is a person appointed in an English union or large parish to administer relief, or rather to inquire into the title of destitute persons to be relieved by such union or parish. He is appointed by the Board of Guardians, and his duty is to receive all applications for relief, to inquire into the truth of the facts alleged by the paupers as to their place of settlement, their state of health, ability to work, and the state of their family. In discharging this duty, he requires to visit the house where the pauper lives, to relieve cases of urgent necessity, &c., and to keep a list of all these paupers, and enter what is done with them in his book.

RELIE'VO. See ALTO-RELIEVO.

RELI'GION, in Christian countries, is generally understood as the feeling of reverence towards the Creator and Ruler of the world, together with all those acts of worship and service to which that feeling leads. The root of this sentiment lies in the very constitution of man, and in the circumstances in which he is placed, and manifests itself abundantly even where the one supreme God of the Christian is unknown. Man is naturally religious, and if he is ignorant of the true God, he must make to himself false ones. He is surrounded by dangers and difficulties; he sees the mighty powers of nature at work all around, pregnant to him with hope and fear, and yet inscrutable in their working, and beyond his control. Hence arises the feeling of *dependence* upon something more powerful than himself—the very germ of religion. These operations

of nature, again, he has only one way of conceiving and accounting for. The idea of physical causes is one of late growth; to the primitive man, there is only one kind of agency he can understand—that of a will or mind like his own. Hence all things that he sees moving and acting become to him animated, conscious beings, with thoughts and passions similar to those of men; and what more natural than that he should seek, by offerings and entreaties, to secure their favour, or propitiate their malignity or anger. There is no doubt a vast distance between the reverence with which the Christian looks up to Him that fills the universe, and that of the poor fetich-worshippers (see FETICHISM), but in both cases it is the same feeling that is at the bottom—they are both manifesting religion.*

According to this view, religion includes all forms of belief in the unseen and spiritual powers or gods, together with the practices arising out of those beliefs. The forms that religious belief has assumed are endless, but they may be all classed under two heads: *Monotheism*, or the belief in *one* God; and *Polytheism*, or the belief in *many* gods. The several modes of religious belief and worship are treated in this work each under its own name. See JEWS; CHRISTIANITY; ENGLAND, CHURCH OF; ROMAN CATHOLIC CHURCH; PRESBYTERIANISM; FRIENDS; GREEK RELIGION; MOHAMMEDANISM; INDIA, RELIGION; BUDDHISM; LAMAISM, &c. Subjoined is a statistical table of the divisions of mankind in this respect.

I.—JEWS.

France (including Algeria),	185,000	
Holland and Belgium,	66,000	
Russia and Poland,	2,000,000	
Turkey,	150,000	
Austria,	1,019,871	
Prussia,	252,692	
German States,	476,000	
Great Britain and Ireland,	42,000	
United States,	200,000	
British America,	1,241	
Persia, Egypt, India, China, and Tartary,	2,000,000	
Africa,	1,000,000	
Australia,	2,903	
Total Jews,		7,425,707

II.—CHRISTIANS.

I.—ROMAN CATHOLICS.

America—		
British America,	1,760,000	
United States,	3,000,000	
Mexico and Central America,	9,848,000	
South America,	21,200,000	
Spanish, French, Dutch, Danish, and Swedish Possessions (including Hayti),	2,911,000	
		38,759,000
Europe—		
Portugal,	3,913,000	
Spain,	16,550,813	
France,	35,731,667	
Austria and Venetia,	27,505,375	
Prussia,	6,867,574	
German States (exclusive of Holstein, Lauenburg, Luxemburg, and Limburg),	5,587,473	
Italian Kingdom,	21,350,000	
Switzerland,	1,023,430	
Holland (inclusive of Luxemburg and Limburg),	1,250,000	
Belgium,	4,600,000	
Great Britain and Ireland,	6,000,000	
Denmark Proper (inclusive of Iceland and the Faröe Islands), Slesvig-Holstein, and Lauenburg,	2,000	
Sweden and Norway,	4,000	
Russia, Poland, and Finland,	7,020,000	
Turkey,	640,000	
Greece,	15,000	
Ionian Islands,	40,000	
		138,103,332
Asia—		
Asiatic Russia,	6,000	
East Indies with Ceylon,	1,033,000	
Further India and China,	857,000	
Asiatic Turkey,	260,000	
Asiatic Archipelago,	2,000,000	
Arabia and Persia,	11,000	
		4,167,000
Africa—		
English, French, Portuguese, and Spanish Possessions,	1,041,000	
Egypt, Abyssinia, Tunis, Tripoli, Morocco, and Madagascar,	72,200	
		1,113,200
Polynesia,		280,000
Total Roman Catholics,		182,422,532

II.—GREEK CHURCH.

Austria,	2,918,000	
Prussia,	1,300	
Russia,	59,000,000	
Turkey,	11,625,000	
Greece,	1,080,000	
Total Greek Church,		74,624,300

III.—PROTESTANTS.

Europe—		
Spain and Portugal,	17,000	
France,	1,561,250	
Austria (including Venetia),	3,233,486	
Prussia,	11,287,448	
German States (exclusive of Holstein, Lauenburg, Luxemburg, and Limburg),	11,075,502	
Italy (including the Papal Territory and San Marino, but exclusive of Venetia),	50,000	
Switzerland,	1,482,848	
Holland (inclusive of Luxemburg and Limburg),	2,023,000	
Belgium,	25,000	
Great Britain and Ireland,	23,000,000	
Denmark Proper (inclusive of Iceland and the Faröe Islands, Slesvig-Holstein and Lauenburg),	2,670,000	
Sweden and Norway,	5,463,000	
Russia, Poland, and Finland,	3,940,000	
Turkey,	40,000	
Ionian Islands,	2,000	
		65,870,534
Asia—		
Asiatic Russia,	40,000	
East Indies (with Ceylon and Further India),	300,000	
Arabia, Turkey, Persia, China, and Archipelago,	89,000	
		429,000
Africa—		
English Possessions,	650,000	
Liberia, Algeria, Egypt, and Madagascar,	69,000	
		719,000
Polynesia,		1,000,000
America—		
British America,	2,590,000	
United States,	25,000,000	
South America,	50,000	
Dutch, Danish, and Swedish Possessions (including Hayti),	97,000	
		27,737,000
Total Protestants,		95,755,534

III.—MOHAMMEDANS.

Turkey, Persia, Arabia, Tartary, Madagascar, Africa, India, Archipelago,	120,000,000

IV.—HINDUS.

India,	120,000,000

V.—MAGIAN RELIGION OR PARSEES.

India,	1,000,000

* The word *religion* is of Latin origin, and according to its etymology would mean 'binding,' 'obligation,' or rather 'restraint.' It was applied by the Romans to all actions in which men are guided, not by motives deducible from the ordinary course of nature, but by regard to some unseen power or mysterious influence; as when Livy says of a spot in the forum: *ubi despui religio est,* 'where spitting is a matter of religion,' i. e., where there is a religious scruple restraining people from spitting.

VI.—BUDDHISM AND RELIGIONS OF CHINA AND JAPAN.

Further India and Burmah,	23,000,000	
Tartary,	8,000,000	
Ceylon,	1,600,000	
China,	415,000,000	
Japan,	35,000,000	
		482,600,000

SUMMARY.

The religions of the world may, from the above tables, shortly be summarised in round numbers as follow:

1. Jews,	8,000,000
2. Christians,	353,000,000
3. Mohammedans,	120,000,000
4. Brahminical Hindus,	120,000,000
5. Parsees,	1,000,000
6. Buddhists,	483,000,000
7. To which may be added the Fetichism of the aboriginal tribes of Africa, America, Polynesia, &c.,	189,000,000
Total,	1,274,000,000

—which, according to statistical writers, is the present population of the globe.

PROTESTANTS.

The following table, drawn up from reliable data, shews the numerical strength of the principal churches and sects into which the Protestant part of Christendom is divided:

1. Lutherans,	30,767,924
2. Calvinistic Churches,	12,716,958
3. Anglican Church,	14,459,000
4. Presbyterians,	3,866,000
5. Baptists,	2,439,436
6. Congregationalists,	1,445,683
7. Methodists,	4,406,422
8. Quakers,	203,091
9. Swedenborgians,	12,000
10. Moravians,	157,925
11. Unitarians,	183,000
12. Universalists,	656,000
13. Minor Christian Sects—	
Brethren,	108,422
Campbellites,	710
Christian Chartists,	220
Christian Disciples,	2,471
Evangelical Union,	10,319
Free Christian Brethren,	340
Irvingites,	6,000
Mormons,	100,902
Sandemanians,	1,700

RELIGION, Offences Against. See Brawling in Churches. In Scotland, the crime of blasphemy is sometimes described as the crime of treason or lese-majesty against God, which consists in denying His being and attributes, and uttering impious and profane things against God, or the authority of the Holy Scriptures. The crime was more rigorously punished by the old statutes of Scotland than by those of England; but the statute 6 Geo. IV. c. 47 declared it expedient that the punishment should be the same, and enacted accordingly. Profanity is in Scotland treated as an offence lower in degree than blasphemy, and includes profane swearing, which is punishable with a fine by justices of the peace; scoffing at religion, or the public mocking or contempt of religion, which is punishable in the same manner, and the disturbance of public worship. The first statute providing against disturbances of public worship was dated 1551, which inflicted a fine; but a later statute of 1587, added escheat of movables as part of the punishment, and applied the penalty to all cases of raising a fray or disturbance in the kirk-yard equally as in the kirk, to the troubling or dispersing of the people assembled there for religious purposes.

RELIGIOUS TRACT SOCIETY, a Society for the promotion of religion by the publication and circulation of religious tracts and small books. By far the most important Religious Tract Society in the world is that of London, which was founded in 1799. There are now, indeed, numerous Religious Tract Societies in different parts of the world, comparatively limited in their field of operations; this great Society reckoning many of them as its branches and auxiliaries. The advantage likely to accrue to the cause of religious truth by the diffusion of tracts and pamphlets, was thoroughly appreciated at the time of the Reformation, but no society was formed for the purpose. In the 17th c., several traces are found of associations for printing and promoting the sale of religious works, but none of them seems to have existed long, or to have been intended for permanence. The English 'Society for Promoting Christian Knowledge,' founded in 1701, avowed, for one of its objects, 'to disperse, both at home and abroad, Bibles and tracts of religion.' In 1750, a society was formed in England, called 'The Society for Promoting Religious Knowledge among the Poor,' not, like the former, confined to the Church of England, but embracing Christians of all denominations, which published many tracts and books; and shortly after, similar societies were founded in Edinburgh and Glasgow, which, however, were of brief existence. The design of the Religious Tract Society originated with Mr Burder, a minister at Coventry, and amongst its founders were Rowland Hill, Matthew Wilks, and other ministers eminent in their day. It was founded on occasion of the annual meeting of the London Missionary Society. Its beginnings were humble but it soon expanded, until its income, from contributions of benevolence, has for many years been always above £4000, sometimes nearly twice that sum. It derives also a large income from the sale of its publications. Its operations have extended over all quarters of the world, and it has issued books and tracts in more than 100 different languages and dialects, thus rendering very efficient assistance to missionary and other evangelistic operations. Many of the publications of the Society, except during the first years of its existence, have been books rather than tracts. It has produced many new works, and also many reprints and abridgments.

Objections are sometimes strongly urged against its mode of operations, as interfering with the natural course of the book-trade, and checking free commercial enterprise; to which it has been always replied, that the diffusion of good and cheap books has increased the demand for them, and that the influence of the Society has been favourable and not unfavourable to the book-trade in general. It is impossible, however, to accept this as any proper answer to the objections in question. Fair competition in trade is a sacred principle not lightly to be interfered with, and it is sufficient to say that certain members of the general publishing business complain of being encountered by a system of production which leaves them no hope of competing successfully with the Society. That tracts distinctly religious may be rendered a valuable engine of spiritual and social advancement is not to be disputed; and those impressed with this conviction cannot but regret that among the immense mass of tracts issued in Great Britain and the United States, so many, owing to the exaggerated and false views they present, not only of the facts of life but of the teaching of Scripture, are calculated to damage rather than promote the cause they are meant to serve.

RE'LIQUARY, a case or box to contain relics. They are made of all kinds of materials, such as wood, iron, stone, ivory, silver, &c., and are frequently ornamented with costly jewels. Shrines

are of the same description. That of the 'Three Kings,' at Cologne, has jewels valued at £240,000.

RELI'QUIÆ (Lat. remains), applied in Geology to the remains of plants and animals found fossil in the sedimentary deposits.

REMAI'NDER is a term much used in the law of England. Thus, if the owner of the fee-simple, or freehold of lands, give them by will or deed to A for life, and after his decease to B and his heirs, the interest of B is called the remainder, because, after deducting A's life estate, all that remains belongs to B. A remainder is distinguished from a reversion in this, that in the latter case, the remainder returns to the owner of the estate himself, and so it is called, in that instance, a reversion instead of a remainder. A contingent remainder is too technical a term to be popularly explained, though it plays an important part in the law of real property in England. It is an estate which may or may not ever become vested or enjoyable.

REMBA'NG, a town and seaport of Java, capital of a residency of the same name, stands on the north coast of the island, in long. about 111° 10' E. It contains 11,000 inhabitants, and is the seat of some trade. The residency, of which the area is 2600 sq. m., the pop. 460,000, contains forests which are the peculiar haunts of the black tiger, an animal found nowhere out of the island.

REMBRANDT HERMANSZOON, commonly called REMBRANDT VAN RHYN, was the son of a miller, Herman Gerritsz van Rhyn, whose house (where the painter was born) and mill were situated on an arm of the Rhine at Leyden. R. was born either on 15th July 1606, or in 1608. The former date rests on the authority of the *Description of Leyden*, published in 1641, by Orlers, burgomaster of that town, under whose custody, along with other registers of the city, were those of the registers of baptism, since lost. The latter date rests on the painter's marriage-certificate, lately discovered, dated 10th June 1634, in which R. is stated to be aged 26, and thus the year of his birth 1608. He attended for a short time the Latin School at Leyden; and after studying art three years under Jacob van Swanenburg, and for a very limited period under Pieter Lastman at Amsterdam, and Jacob Pinas at Haarlem, he returned home, and devoted himself to the study of nature. His works now attracted some attention; and about the year 1630, he was encouraged to establish himself at Amsterdam, where he soon entered on a most successful career, and executed numerous works - portraits, landscapes, historical and *genre* subjects, and those wondrous etchings, numbering above 360, which have served almost as much as his paintings to raise his reputation so high. R. holds the chief place in the Dutch School; his power and originality are exemplified in almost every branch of art; and as examples of composition, expression, colour, and light and shade, his works rank with those of the greatest artists. He had numerous pupils, many of whom, such as Gerard Dow, G. Flinck, F. Bol, N. Maas, P. de Koning, and Vanden Eeckhout, were distinguished artists. R. spent his large gains in the indulgence of a taste for works of art, arms, and objects of *vertù*, as is proved by an inventory of his effects, extracted from the registers of the Insolvents' Court at Amsterdam, for he got into difficulties, partly from his expensive habits, and partly on account of claims by the tutors of his son, after the death of his first wife. He married a second time, and left two children; his son Titus, by his first wife, predeceased him. Many interesting matters connected with the history of this great painter have been brought to light, and published so lately as 1853, by Dr P. Scheltema, Keeper of Records at Amsterdam. The date of the painter's decease was a matter of doubt; but among other documents discovered by this author, the following extract, from the Register of Burials of the city of Amsterdam, proves that he was interred in the Westerkerk (West Church) on 8th October 1669: 'Deynsdach, 8th October 1669, Rembrant van Rijn, Schilder, op de Rosegraacht, teghenover het Doolhof. Laet na 2 Kynders.'—('This day, 8th October 1669 [was buried] Rembrant van Rhyn, Painter, on the Rosegraacht [Rose-Canal], opposite the Labyrinth. He leaves two children.')

REMIREMONT, a small town of France, in the department of Vosges, stands on the left bank of the Moselle, 17 miles south-east of Epinal. Here, two abbeys, founded in 620, were destroyed in the 10th c., but afterwards rebuilt. Of these, the more important was for lady canonesses. Its abbess was a princess of the empire, and those over whom she presided were all descended from families which had been noble for at least four generations. The remains of the abbey are the finest buildings in the town. Linen and muslin goods are extensively manufactured; and paper, leather, and wrought-iron are made. R. is the great mart for the neighbouring mountain districts. Pop. 5194.

REMI'SSIO INJU'RIÆ, in Scotch Law, denotes a forgiveness of an injury, and it is set up in answer to an action of divorce for adultery. Forgiveness implies that the party knew of the injury, and acted as if it had never happened; and it is proved by words or acts, such as cohabitation. In English law, it is called condonation. In Scotch law, remission is an extinguishment of a crime by pardon or by act of parliament, but it does not prevent a private party recovering damages.

REMI'TTENT FEVER is one of the three varieties of fever arising from malaria or marsh-poison—the two others being Intermittent Fever, or Ague (q. v.), and Yellow Fever. In its milder forms, it scarcely differs from severe intermittent fever; while in its more serious form, it may approximate closely to yellow fever. As the nature of the poison on which it depends is sufficiently noticed in the article MIASMA, we shall at once proceed to describe the most characteristic symptoms. The attack may be either sudden or preceded by languor, chilliness, and a general feeling of *malaria*. Then comes a cold stage, similar to that occurring in ague, and usually of short duration. This is followed by a hot stage, in which the symptoms are commonly far more intense than those exhibited in the worst forms of ague. Giddiness proceeding to delirium is not uncommon, and is a bad symptom; while, in other cases, drowsiness or lethargy is one of the most marked symptoms. There is often great tenderness or pain in the region of the stomach, and vomiting—the vomited matter frequently containing bile or blood. A remission of these symptoms occurs, in mild cases, in six or seven hours; but, in severe cases, the paroxysm may continue for 24 hours or longer. The remission is sometimes, but not always, accompanied with sweating. The duration of the remission is as varied as that of the paroxysm, varying from two or three to thirty hours, or even longer. The fever then returns with increased severity, and without any cold stage; and then the paroxysms and remissions proceed, most commonly according to no recognisable law, till the case terminates either fatally or in convalescence. In favourable cases, convalescence is usually established in about a week. The severer forms of this

fever are often accompanied with more or less jaundice, and hence the disease has received the name of bilious remittent fever. It is also known as jungle fever, lake fever (from its prevalence on the border of the great American lakes); and the African, Bengal, Levant, Walcheren, and other similar local fevers, are merely synonyms of this disease. In England, the disease is very rare; and when it occurs, it is usually mild. The disease is most severe in Southern Asia, Western Africa, Central America, and the West India Islands.

The first object of treatment is to reduce the circulation during the hot stage. This is done by bleeding, followed by a dose of five grains each of calomel and James's powder, and, after an interval of three or four hours, by a sharp cathartic—as, for instance, the ordinary black draught. On the morning of the following day, the remission will probably be more complete, when quinine, either alone or in combination with the purgative mixture, should be freely and repeatedly administered. A mixture of antimonial wine with acetate of potash should also be given every two or three hours, so as to soften the skin, and increase the action of the kidneys. Sir Ranald Martin—our highest authority in relation to tropical diseases—has directed attention to the fact, that the patient must be carefully watched during the period of convalescence. A timely removal from all malarious influence, by a change of climate or a sea voyage, is of the highest importance, and is more likely than any other means to prevent fatal relapses into other forms of fever, or into dysentery, which so frequently occur to our troops at stations where miasmatic influences are rife. Although the above sketch of treatment is applicable in most cases, there are some forms of this fever in which blood-letting cannot be borne; and almost every epidemic fever of this kind requires special modifications of treatment. The following data, extracted from a table drawn up by Sir Alexander Tulloch, will give some idea of the frequency of this disease and the variations in intensity:

	Period of Observation.	Aggregate Strength.	Number Attacked.	Died.	Ratio of Deaths to Cases Attacked.
Jamaica, .	20 years,	51,567	38,393	5114	1 to 8
Gibraltar, .	19 "	60,269	1,522	423	1 " 3[illegible]
Ionian Islands,	20 "	70,293	6,931	623	1 " 11
Ceylon, . .	20 "	42,978	4,643	868	1 " 5¼
Madras, .	5 "	31,627	1,139	54	1 " 21
Bengal, . .	5 "	38,136	1,311	89	1 " 14¾
W. Africa, .	18 "	1,843	1,601	739	1 " 2

REMO'NSTRANTS. See ARMINIUS.

RE'MORA, or SUCKING-FISH (*Echeneis*), a genus of fishes which Cuvier placed among the *Discoboli* (q. v.), but which Müller assigns to the order *Anacanths*, and regards as constituting an entire family, *Echeneidæ*. Their chief relation to the *Discoboli*, indeed, is in the possession of a sucker, by which to affix themselves to objects of various kinds; but the sucker itself is very different. The remoras have an elongated body, covered with very small scales; one soft-rayed dorsal fin, situated above the anal fin; the head flattened, and covered with an elongated disc extending back beyond it, which is the sucker; the mouth large, with numerous small recurved teeth on both jaws, the vomer, and the tongue. The sucker-disc exhibits numerous transverse cartilaginous laminæ directed backwards, and has a free flexible broad margin. These laminæ are formed by modification of the spinous processes of a first dorsal fin. They are moved simultaneously by sets of muscles raising or depressing them, and when they are raised after the margin of the disc has been closely applied to a smooth surface, a vacuum is created; and so powerful is this apparatus, that great weights may be dragged by a R.; whilst it obstinately refuses to let go its hold, and will even submit to be torn in pieces before it does so. The Common R. of the Mediterranean, and of the ancients, is a small fish, seldom more than eight inches long, of a dusky-brown colour. It is found in the Atlantic, and occasionally as far north as the British coast. It is frequently seen among the other fishes following ships, and often attaches itself by its sucker to some other fish, even of a kind that would make haste to devour it if it could be reached—an instance of which once occurred on the British coast, a R. being taken affixed to a cod—often also to the rudder or bottom of a ship. The ancients imagined that it had power to impede or arrest the course of a ship, a fable which continued to be credited till recent times. Thus, it was alleged, was Antony's ship detained from getting soon enough into action in the memorable and decisive battle of Actium. Of what use its power of adhesion is to the R., is matter of mere conjecture. The R. is very palatable. There are about ten known species, some of the tropical ones much larger than the Common Remora. One of them is said, on the authority of Commerson, to be used on the coasts of Mozambique for the curious purpose of catching turtles. A ring is fixed round its tail, with a long cord, and the fish, placed in a vessel of sea-water, is carried out in a boat; the fishermen row gently towards a sleeping turtle, and throw the R. towards it, which seldom fails immediately to affix itself, when the cord is drawn in, and the turtle becomes an easy prey.

REMOULADE, a term in Cookery for a fine kind of salad-dressing, consisting of the yolks of two eggs, boiled hard; flour of mustard, about a teaspoonful, rubbed up with three or four tablespoonfuls of oil; when they are thoroughly incorporated, add two tablespoonfuls of vinegar and a little pepper, and other flavouring materials according to taste. It is much used in making the salad called Mayonnaise.

REMO'VAL OF GOODS by a tenant of a house to prevent the landlord distraining or seizing them in payment of rent, is attended with this consequence: if the rent is already due, and not merely current rent, then, if a tenant fraudulently or clandestinely remove the goods from the premises, the landlord may, within 30 days thereafter, take and seize these goods wherever they are found, and sell them, by way of payment of his rent. If the tenant remove the goods the day before the rent becomes due, the landlord cannot so follow the goods. Whoever assists the tenant to remove his goods fraudulently, forfeits to the landlord double the value of the goods removed.

REMOVAL OF PAUPERS, in the law of England, is the technical term applied to the compulsory removal of paupers from a parish in which they have become destitute, to the parish of their settlement, and which, therefore, is bound to maintain them. The right of parochial officers to remove paupers in such circumstances has long been considered as one of doubtful wisdom, and the propriety of continuing it has latterly been much discussed. As the law stands, wherever a person becomes destitute in a parish in which he was not born, or in which he has not acquired a Settlement (q. v.), as it is called, the overseers may apply to a justice of the peace at once to remove him to his own parish. In such a case, notice must be given by the removing parish to the parish of settlement, so that the latter may oppose the proceeding;

and this gives rise to frequent litigation, for the point turns on the antecedent history of the pauper, or it may be of the pauper's father or grandfather. The right of removing paupers is as old as 13 Charles II. At first, it was in the power of the overseers, whenever a poor person came into the parish who was likely to become chargeable, to apply for a warrant to remove him after forty days. But this was thought too great a restriction on the natural liberty of poor persons to go where they like in the hope of bettering themselves, and the power of removal was restricted to cases where they have already become actually destitute, and apply for relief. Even that limitation was thought to be too oppressive on the poor man: and by a statute of 1846, whenever a poor man had lived in any parish, where he had no settlement previously, for five years, it was not allowed to remove him thereafter at all, but the expense of his maintenance fell upon the common fund of the union. By a later statute of 1862, this period was reduced to three years, and he is now irremovable not only if he has lived three years in a parish not his own, but in any one union; so that now the removability of paupers is greatly checked, and made less oppressive.

REMOVING OF TENANTS, in Scotch Law, is the giving up of possession by a tenant after the expiry of his lease or term. There must have been a previous notice to quit, or warning, before a tenant can be compelled to remove, and this notice is forty days before Whitsunday; i.e., before 15th May. If there is no express stipulation in the lease binding the tenant to remove at the end of the lease, then the landlord must give warning, which he does by summons of removing in the Sheriff Court; and if the tenant do not punctually remove, decree of removal may be obtained. If there is a stipulation to remove, then that is equivalent to a decree of removing, and a sheriff-officer, with a written authority from the landlord, can remove the tenant by force. In England, no notice to quit is necessary on either side if the lease was for a definite term; but if it was indefinite, then it is treated as a lease from year to year, and half a year's notice to quit must be given by the landlord. If, however, the tenant wrongfully refuse to quit, there is in most cases no summary mode of ejecting him, and an action of ejectment is necessary.

RE'MSCHEID, a manufacturing town of Prussia, occupies a height of 1110 feet above sea-level, in the government of Düsseldorf, and 18 miles east-south-east of the city of that name. Originally a villa, it was in possession of a church as early as 1189. It contained several iron-foundries in 1580, in which pig-iron was worked into bars by hand. Its iron trade and manufactures were advanced by the immigration of numbers of artisan Refugees (q. v.). It carries on extensive manufactures of iron wares, cutlery, &c., which are exported to all parts of the world. Pop. (1862) 16,725.

REMUSAT, Charles, Comte de, a French philosopher and politician, son of Auguste Laurent, Comte de Remusat, a Provençal gentleman of some note, who held various public offices during the first Empire and after the Restoration, was born at Paris, 14th March 1797, and studied with brilliant success at the Lycée Napoléon. He made his political *début* in 1818 as a Doctrinaire journalist, allying himself closely with Guizot, who, he confessed, had exercised a greater influence on the formation of his opinions than any other; but he subsequently withdrew from this connection, and became more independently liberal, though he always remained temperate and prudent in his views. Among his earlier political essays, the most important are *Sur la Responsabilité des Ministères; Sur la Liberté de la Presse; Sur la Procédure par Jurés en Matière Criminelle* (1820); and *Sur les Amendements à la Loi des Elections* (1820). On the establishment of the *Globe* in 1824, R. became one of its most indefatigable contributors, and his name appears in the list of journalists who signed the protest against the fatal 'ordonnances' of the minister Polignac, which brought about the July revolution. After 1830, R. entered the French chambers as deputy of Muret in the Haute-Garonne, representing it till 1848. He supported the ministry of Casimir Périer, was for a brief period Under-secretary of State (1836) in that of Comte Molé; and in 1840, when the government passed into the hands of Thiers, R. was made Minister of the Interior, but soon resigned the office. After the flight of Louis Philippe, he continued a member of the Constituent and Legislative Assemblies, and was a warm supporter of the party of order. He was exiled (like so many other of the best men in France) after the *coup d'état* of Louis Napoleon, but subsequently received permission to return to France, and has since devoted himself to the serener pursuits of literature and philosophy. For more than 20 years, he has been a contributor to the *Revue des Deux Mondes*, where his clear, logical, and vivid style is well known. Among his philosophical efforts are his *Essai sur la Nature du Pouvoir; Essais de Philosophie* (Paris, 2 vols. 1842); *Abelard* (2 vols. 1845); *Passé et Présent, Mélanges* (2 vols. 1847); *Saint Anselme de Cantorbéry* (1852); *Bacon, sa Vie, son Temps* (1858).

REMUSAT, Jean Pierre Abel, a distinguished Chinese scholar, was born at Paris, 5th September 1788, studied medicine, and took his diploma in 1813; but as early as 1811, had published an *Essai sur la Langue et la Littérature Chinoises*, the fruit of five years' arduous work. In 1813, the conscription seized him, but, instead of being compelled to serve as a common soldier, he was appointed assistant-surgeon in the Paris military hospitals, and was subsequently intrusted with the charge of fever-patients at the hospital Montaigu. In the midst of his arduous and harassing professional duties, he found time to prepare for the press his *Uranographie Mongole*, and *Dissertation sur la Nature Monosyllabique attribuée communément à la Langue Chinoise.* At last, however, the day came when he was at liberty to devote himself entirely to Sinological studies. The Abbé Montesquiou, Minister of the Interior during the first Restoration of the Bourbons, instituted a chair of Chinese at the Collége de France, and R. was named professor, 9th November 1814. He delivered a splendid inaugural address in January 1815, an analysis of which appeared in the *Moniteur* of 1st February, executed by Silvestre de Sacy himself. Of the numerous works that he wrote subsequent to this period, we may mention *Recherches sur les Langues Tartares* (1820), a work in some sort preparatory to his *Eléments de la Grammaire Chinoise* (1822), the grandest monument of the vast Sinological erudition and labour of Remusat. Another of his important philological productions was his *Recherches sur l'Origine et la Formation de l'Ecriture Chinoise* (1827). 'Although acquainted,' says M. Walckenaer, 'with several of the most difficult languages of Asia, and with almost all the ancient and modern languages of Europe, he regarded such knowledge as only a means to an end. . . . . In a crowd of treatises, dissertations, critical analyses, and translations, either published as separate works or inserted in *Mémoires*, he has endeavoured to embrace everything relating to the nations whom he

proposed to make known. Religious beliefs, philosophical systems, natural history, geography, political revolutions, the origins of races, biography, literature, manners, habits, and customs—he has treated all in an equally masterly style.' Among the works of R. which illustrate this *éloge* of M. Walckenaer are his *Etude Historique sur la Médecine des Chinois; Tableau Complet des Connaissances des Chinois en Histoire Naturelle* (unfinished); *Sur la Pierre Iu* (a curiously learned disquisition on a crowd of historical questions and religious rites); *Notice sur la Chine et ses Habitants* (in which the author treats of the extent, administration, manners, commerce, &c., of China); *Sur l'Extension de l'Empire Chinois en Occident depuis le Premier Siècle avant Jésus-Christ jusqu'à nos Jours*, a work that has thrown much light on the interesting question: Who were the barbarians that overthrew the Roman empire? R., in particular, paid great attention to the religions of China, except, strange to say, that of Confucius. He was the first to make known in Europe the life and opinions of the philosopher Laou-Tsze, head of the religious sect *Taou-tsé*, and wrote numerous works, more or less valuable, on the history of Buddhism. A list of his various works is given in the article 'Remusat,' in the *Nouvelle Biographie Générale*, to which we are chiefly indebted for our information. In 1818, R. became one of the editors of the *Journal des Savants;* in 1822 he founded the *Société Asiatique* of Paris, of which he was perpetual secretary; in the following year, he was chosen a member of the Asiatic Societies of London and of Calcutta; and in 1824, he was appointed curator of the Oriental Department in the Bibliothèque Royale. He died of cholera at Paris, 4th June 1832 at the early age of 44.

REMY, or **REMI**, **St** (Lat. *Remigius*), a saint of the Roman Catholic Church, was born of a noble family of Laon, in Picardy, in the year 438 or 439. He was appointed, against his will, at the early age of 22, to the bishopric of Rheims, and his episcopate is memorable for the conversion of Clovis, who was baptised by Remy. It was on occasion of this ceremony that, contrasting our Lord and his cross with the idols whom Clovis had hitherto adored, R. used the words which afterwards became almost epigrammatic: 'Adore henceforward what thou hast hitherto burned, and burn that which thou hast adored.' R. lived to see Gaul almost entirely Christianised, and died in his 93d or 94th year in 533. Some of his letters are preserved in the *Bibliotheca Patrum*, as also two documents under the title of *Testamenta*, the genuineness of which has been the subject of a curious controversy.

RENAISSANCE, the name given to the style of art, especially architecture, in Europe, which succeeded the Gothic, and preceded the rigid copyism of the classic revival in the first half of the present century. Under the heading ITALIAN ARCHITECTURE we have traced the rise and progress of the Renaissance in the country of its birth. The spread of classical literature during the 15th and 16th centuries created a taste for classic architecture in every country in Europe. France, from her proximity and constant intercourse with Italy, was the first to introduce the new style north of the Alps. Francis I. invited Italian artists to his court during the first half of the 16th century. The most distinguished of these were Leonardo da Vinci, Benvenuto Cellini, Primaticcio, and Serlio. These artists introduced Italian details, and native architects applied them to the old forms to which they were accustomed, and which suited the purposes of their buildings, and thus originated a style similar to, though diverse from, that of Italy.

The Italian buildings were chiefly churches, St Peter's being the great model. In France (as in the other countries north of the Alps), the stock of churches was more than was required. The grand domestic buildings of Florence and Rome were actually needed for defence, and were founded in design on the old medieval castles, which the nobles occupied within the cities. The domestic architecture of France is rather taken from the luxurious residences of the monks, and although very graceful in outline and in detail, its buildings want the force and grandeur of the Italian palaces.

In the French Renaissance, so much are the old Gothic forms and outline preserved, that the buildings of Francis I. might, at a short distance, be mistaken for Gothic designs, although, on nearer approach, all the details are found to be imitated from the classic. Such are the palaces of Chambord

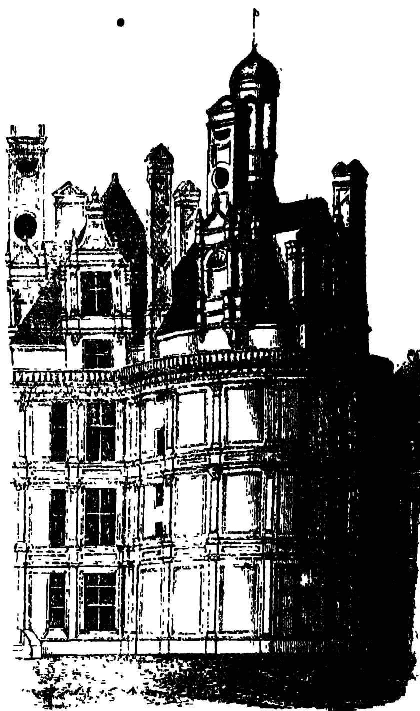


Fig. 1.—Château of Chambord.

and Chenonceaux on the Loire, Fontainebleau, and many others. The churches of this period are the same in their principles of design. Gothic forms and construction are everywhere preserved, while the detail is as near classic as the designers could make it. St Eustache, in Paris, is one of the finest examples of this transitional style.

From the middle of the 16th to the middle of the 17th c., a style prevailed which may be said to have combined all the defects of the Renaissance. It was neither classic nor Gothic. It had no principles of construction or decoration save the individual caprice of the designer. This style, usually known as that of the time of Henry IV., is the basest which has been adopted in France, and has no redeeming qualities. It may be distinguished by the constant use of meaningless pilasters, broken entablatures, curved, and contorted cornices, architraves, &c., all applied so as to conceal rather than to mark and

dignify the real uses of the features of the buildings. The palace of the Tuileries shews well all the above defects. From this debased and meaningless

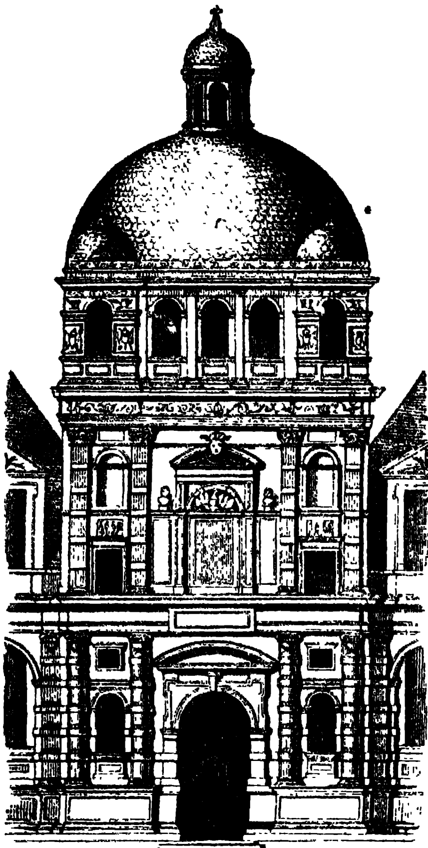


Fig. 2.—Central Pavilion of the Tuileries,
As designed by De Lorme (from Mariette).

style, architecture gradually recovered, and during the 18th c., a style more becoming the dignity and importance of the *Grand Monarque* was introduced. The classic element now began to prevail, to the entire exclusion of all trace of the old Gothic forms. Many very large palaces are built in this style; but, although grand from their size, and striking from their richness and luxuriance, they are frequently tame and uninteresting as works of art. The palace of Versailles (q. v.) is the most prominent example. The two Mansards, one of whom designed Versailles, had great opportunities during this extravagant epoch. Their invention of giving a row of separate houses the appearance of one palace, which has ever since saved architects a world of trouble, was one of the most fatal blows which true street-architecture could have received. The east front of the Louvre, designed by Perrault, is one of the best examples of the style of the age. Many elegant private hôtels and houses in Paris were erected at this period. The most striking peculiarity of the style of Louis XIV. is the ornament then used, called Rococo (q. v.).

The classic Renaissance was completed in the beginning of the present century by the literal copyism of ancient buildings. Hitherto, architects had attempted to apply classic architecture to the requirements of modern times; now they tried to make modern wants conform to ancient architecture. In the Madeleine, for instance, a pure peripteral temple is taken as the object to be reproduced, and the architect has then to see how he can arrange a Christian church inside it! Many buildings erected during the time of the Empire are no doubt very impressive, with noble porticoes and broad blank walls; but they are in many respects mere shams; attempts to make the religious buildings of the Greeks and Romans serve for the conveniences and requirements of the 19th century. This has been found an impossibility—people have rebelled against houses where the window-light had to be sacrificed to the reproduction of an ancient portico, and in which the height of the stories, the arrangement of the doors, windows, and, in fact, all the features were cramped, and many destroyed. The result has been that this cold and servile copyism is now entirely abandoned, and the French are working out a free kind of Renaissance of their own, which promises well for the future; and is, at the present moment, as the streets of Paris testify, the liveliest and most appropriate style in use for modern street-architecture.

In Spain, the Renaissance style took early root, and from the richness of that country at the time, many fine buildings were erected; but it soon yielded to the cold and heavy 'Greco-Romano' style, and that was followed by extravagances of style and ornament more absurd than any of the reign of Louis XIV. The later Renaissance of Spain was much influenced by the remnants of Saracenic art which everywhere abound in that country.

In England, as in the other countries of Europe, classic art accompanied the classic literature of the period; but, being at a distance from the fountain-head, it was long before the native Gothic style gave place to the classic Renaissance. It was more than a century after the foundation of St Peter's that Henry VIII. brought over two foreign artists—John of Padua and Havenius of Cleves—to introduce the new style. Of their works, we have many early examples at Cambridge and Oxford, in the latter half of the 16th century.

Longleat, Holmby, Wallaton, and many other county mansions, built towards the end of the 16th c., are fine examples of how the new style was gradually introduced.

The course of the Renaissance in England was similar to its progress in France; it was even slower. Little classical feeling prevailed till about 1620. The general expression of all the buildings before that date is almost entirely Gothic, although an attempt is made to introduce classical details. The pointed gables, mullioned windows, oriels and dormers, and the picturesque outlines of the old style, are all retained long after the introduction of quasi-classic profiles to the mouldings. This style, which prevailed during the latter half of the 16th c., is called Elizabethan, and corresponds to the somewhat earlier style in France of the time of Francis I. This was followed in the reign of James I. by a similar but more extravagant style called Jacobean, of which Heriot's Hospital is a good example; the fantastic ornaments, broken entablatures, &c., over the windows, being characteristic of this style, as they were of that of Henry IV. in France.

The first architect who introduced real Italian feeling into the Renaissance of England was Inigo Jones. After studying abroad, he was appointed superintendent of royal buildings under James I., for whom he designed a magnificent palace at Whitehall. Of this, only one small portion was executed (1619–1621), and still exists under the name of the Banqueting House, and is a good example of the Italian style. Jones also erected several elegant

mansions in this style, which then became more generally adopted.

In the latter half of the 17th c., a splendid opportunity occurred for the adoption of the Renaissance style after the great fire of London. Sir Christopher Wren rebuilt an immense number of churches in that style, of which St Paul's (q. v.) was the most important. The spire of Bow Church and the interior of St Stephen's, Wallbrook, are also much admired.

During the 18th c., classic feeling predominated, and gradually extended to all classes of buildings. In the early part of the century, Vanbrugh built the grand but ponderous palaces of Blenheim and Castle Howard, which have a character and originality of their own. To these succeeded a vast number of noblemen's mansions, designed by Campbell, Kent, the Adamses, and others.

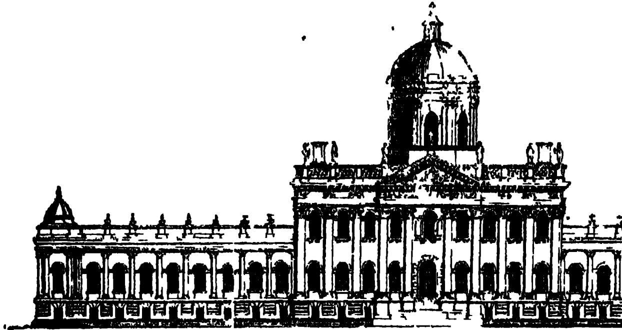


Fig. 3.—Park Front of Castle Howard.

Many of these, like the contemporaneous buildings of France, are of great size and magnificence; but they are usually tame and cold in design, and a sameness pervades them all. They generally consist of a rustic basement-story, with a portico over the centre, and an equal number of windows on either side. The portico is considered essential, and although perfectly useless, the light and convenience of the house are invariably sacrificed for it.

The further study of the buildings of Greece and Rome led, in the beginning of the present century, to the fashion of reproducing them more literally. All important public buildings were now required to be absolute copies of ancient buildings, or parts of them, or to look like such, and then the architect had to work out the accommodation as best he might. St Pancras' Church in London is a good example. It is made up of portions from nearly every temple in Greece! Many really successful buildings, such as St George's Hall, Liverpool, the High School and Royal Institution in Edinburgh, have been erected in this style; but they owe their effect not to their being designs well adapted to their requirements, but to the fact, that they are copies from the finest buildings of antiquity.



Fig. 4.—Part of Park Front of Bridgewater House.

Sir Charles Barry was the first to break away from this thraldom, and to return to the true system of designing buildings—those, namely, which have their general features arranged so as not only to express the purposes they are intended to serve, but in so doing to form the decorative as well as the useful features of the buildings. The Travellers' Club-house and Bridgewater House in London are admirable specimens of his design. There are no superfluous porticoes or obstructive pediments, but a pleasing and reasonable design is produced by simply grouping the windows, and crowning the building with an appropriate cornice.

As already noticed, a similar style of domestic architecture is now being worked out in France; but both there and in this country there has been a reaction against everything classic, and a revival of medieval architecture has superseded that of classic, especially in ecclesiastical buildings. A very large number of churches has been erected within the last 20 years in the Gothic style, but it cannot be said that these are usually well adapted to the modern Protestant service. The most magnificent example of this style is the Palace or Houses of Parliament at Westminster.

In Germany, Russia, and every country of Europe, the Renaissance prevailed in a manner similar to that above described. In Germany, there are few specimens of early Renaissance, the picturesque castle of Heidelberg being almost unique as an early example. The Zwinger and Japanese palaces at Dresden, which are nearly alone as edifices of the beginning of the 18th c., shew how poor the architecture of Germany then was. In the domestic buildings of Nuremberg, Dresden, and other towns of the north of Germany, there are many instances of the picturesque application of classic detail to the old Gothic outlines.

One of the most striking examples of the revival of classic art occurred in Bavaria during the first half of the present century, under the auspices of King Louis. He caused all the buildings he had seen and admired in his travels to be reproduced in Bavaria. Thus, the royal palace is the Pitti Palace of Florence on a small scale; St Mark's at Venice is imitated in the Byzantine Chapel royal; and the Walhalla, on the banks of the Danube, is an exact copy (externally) of the Parthenon. The finest buildings of Munich are the Picture-gallery and Sculpture-gallery by Klenze, both well adapted to their purpose, and good adaptations of Italian and Grecian architecture.

In Vienna and Berlin, there are many examples of the revived Classic and Gothic styles, but the Germans have always understood the former better than the latter. The museums at Berlin, and many of the theatres of Germany, are good examples of

classic buildings.—The domestic architecture of Berlin is well worthy of notice, many of the dwelling-houses being quite equal in design to those of Paris.

Of the other countries of Europe, the only one which deserves remark for its Renaissance buildings is Russia. St Petersburg is, of all the cities of Europe, the one which best merits the title of a city of palaces. From the date at which the city was founded, these are necessarily all Renaissance in character. They are nearly all the works of German or Italian architects, and are unfortunately, for the most part, in the coldest and worst style. The ornaments of the palaces are chiefly pilasters running through two stories, with broken entablatures, &c., and ornaments of the flimsiest rococo. The New Museum, by Klenze, is, however, a marked exception.

Along with architecture, during the period of the Renaissance, Painting and Sculpture (q. v.) and all the other arts took their models from the classic remains which were so carefully sought for and studied. All ornamental work, such as carving, jewellery, and metal-work of all kinds, followed in the same track. Medieval niches and pinnacles gave place to the columns and entablatures of the classic styles, and the saints of the middle ages yielded to the gods and goddesses of ancient Rome.

RENAIX, a town of Belgium, in the province of East Flanders, picturesquely situated, 24 miles by railway south of Ghent. Brewing, tanning, distilling, and salt-refining are carried on; and fine linen and damasks, woollen fabrics, hats, and tobacco, are extensively manufactured. Pop. 14,000.

RENAN, JOSEPH ERNEST, a renowned French theologian and orientalist, was born in 1823 at Tréguier (Côtes-du-Nord). His first education he received at the hands of the priests who directed the school of his native place. At sixteen years of age, he was sent to Paris, where he entered the seminary of Abbé Dupanloup, to prepare himself for the church. Three years later, he went to Issy, and having completed his philosophical studies there, to St Sulpice. On leaving this, however, he declared himself unable to follow out the path traced for him. The theological and linguistical studies, to which he had devoted himself with rare industry, had led him to results which did not seem to allow him the exercise of priestly functions in his church. He took the place of *répétiteur* in a school, and here prepared himself for an academical career. In 1847, his Memoir *Sur les Langues Sémitiques* ('On the Semitic Languages') obtained the Volney Prize; and the following year, another Memoir of his, *Sur l'Etude du Grec dans l'Occident au Moyen Age* ('On the Study of Greek in the West during the Middle Ages') was crowned. In 1848, he began to publish a periodical, *La Liberté de Penser* ('Liberty of Thought'), in which he embodied some of his most brilliant essays on theology, philosophy, philology, history, and the many variegated branches of his studies, which, however, were all merely preparatory to the great work for which he concentrated all his energies—viz., the investigation of the origin of Christianity, which, according to him, is as human and natural, and has grown out of the history and circumstances of the times, in precisely the same manner as any other event in the records of humanity. His Memoir, *Sur les Langues Sémitiques*, he expanded in 1855 into a *Histoire Generale des Langues Sémitiques* ('General History of the Semitic Languages'), which, with all its shortcomings, is the most methodical and brilliant compilation on the subject. Of the variety of subjects to which he devoted his time besides, his numerous contributions to the *Revue des Deux Mondes* and the *Journal des Débats*, bear ample witness. In 1850, he published a historical essay, *Sur Averroes et l'Averroisme*, for which he had collected materials on a scientific journey to Italy. In consequence of this he was appointed *Employé* at the Imperial Library in Paris. He further produced translations of Canticles and the Book of Job, with introductions and commentaries (*Le Cantique des Cantiques*, &c., 1860, *et Le Livre de Job*, &c., 1859). In 1860, he was sent by the Emperor on a tour of exploration to Syria and Phœnicia, the results of which, however (now in the course of publication), fall rather short of the general expectations. On his return, he was elected to the chair of Hebrew professorship at the Collége de France; but his inaugural lecture made him, through its too free handling of theological matters, so obnoxious to those in power, that his course was first suspended, and finally his professorship was taken from him. Of his most recent work, *La Vie de Jésus*, forming Part I. of his *Origines du Christianisme*, in the same way as his *Histoire des Langues Sémitiques*, is the first part only of a large work entitled *Histoire Générale et Système comparé des Langues Sémitiques*, it is hardly necessary to say more than that it has, temporarily, created the profoundest emotion throughout Europe, and, in fact, the whole civilised world. An abstract of it, in a more popular form, has been published by him under the title *Jésus*. His various minor essays have been collected into two volumes, respectively called *Etudes d'Histoire Religieuse* (1856) and *Essais de Morale et de Critique* (1859).

RE'NDSBURG, a strongly fortified town, in the duchy of Holstein, stands at the point of junction of the river Eider and the Kiel Canal, 67 miles north-north-west of Altona by railway. R. is favourably situated for commerce, and carries on an active trade in timber. Pop. 11,782.

RENÉ or **RENATUS I.**, surnamed 'the Good,' titular king of Naples and Sicily, the son of Louis II., Duke of Anjou and Count of Provence, was born in 1408 at Angers. R.'s paternal grandfather, Louis I., Duke of Anjou, and second son of John the Good, king of France, had been adopted in 1380 by Joanna I., queen of Naples, as her successor; and on his death, a few years afterwards, his son, R.'s father, was crowned king of Naples and Sicily. He, however, did not derive any substantial advantages from this recognition of his presumed rights; and when, on his death and that of his eldest son, Louis II., R., as the next heir, endeavoured to make good his pretensions to the great Neapolitan heritage, he found himself involved in disastrous disputes with numerous other aspirants to the coveted throne. R. had married Isabella of Lorraine, and through her was also a claimant of the rich territories of Lorraine, and consequently brought upon himself the enmity of his wife's brother-in-law, the Duke of Burgundy, who laid equal claim to the heritage of the ducal House of Lorraine. The best years of R.'s life were spent in the fruitless effort to establish these pretensions; but when, in 1442, his powerful rival, Alfonso of Aragon, took Naples, after a protracted siege, the struggle was virtually decided; and R., recognising at length the futility of his schemes, retired to his hereditary dominions in Provence, and thenceforth occupied himself with the administration of his territories, and with the cultivation of poetry and painting, in both of which he attained a degree of proficiency above the average of his age, as is shewn by the poems and illuminated illustrations by his hand still preserved in the Imperial

Library at Paris. In 1445, R. gave his beautiful daughter Margaret in marriage to Henry VI. of England, and at the same time obtained from his royal son-in-law the restitution of Anjou and Maine, which had remained in the hands of the English since the successful wars of Henry V. This did not, however, prevent R. from taking part in the wars of Charles VII. against the English in 1449; but after a brief stay with the army, R., wearied with the excitement and discomforts of war, retired to Aix in Provence, where for many years he attracted to his court the cultivators of song and romance, while he encouraged manufactures, and augmented the resources of the province by the introduction of improved methods of agriculture, and the importation of various useful trees and plants, and died in 1480, universally regretted by his subjects, among whom the memory of 'the good king René' was long held in great veneration. R.'s sons had died before him; and as with him the House of Anjou became extinct, its territorial dominions lapsed to the French crown, and have since that period formed an integral part of France.

RENEW'AL of a Bill of Exchange is matter of agreement between the parties, and a new bill is granted by the party liable to pay in substitution for the old one. The result is, that the former bill is suspended in its operation till the renewed one arrives at maturity. But the former one is not extinguished, for it revives if the renewed bill is not paid; and even though the renewed bill is paid, an action may be brought on the former bill to recover the interest due upon it.

RE'NFREW (anciently *Strathgryffe*), a county in Scotland, 31 miles long, by 13 broad, is bounded on the N. and W. by the river and Firth of Clyde, on the S. by Ayrshire, and on the E. and N. by Lanarkshire. Area 247 sq. m., or 158,268 acres; pop. (1861), 177,561.

R. is very unequal in its surface, and consequently in the nature and quality of its soil; the highest portion of it, composing two-thirds of its surface, reach to the height of 1240 feet above the level of the sea, and gradually decline to a level extending to some 12,000 acres. R. was divided in 1815 into the Upper and Lower Wards, with a sheriff-substitute for each. There are extensive mineral deposits in the county, employing a large number of people, and constituting a great source of commerce and wealth. The manufacture of soft goods, comprising silk, cotton, and muslin fabrics, is carried on to a great extent; and the good roads and railways, together with the seaports of Greenock and Port Glasgow, afford ready means of transit both for home and foreign trade. The chief towns, besides these ports, are Renfrew (q. v.), Paisley (q. v.), and Johnstone (q. v.).

Besides the Clyde, and some small streams, there are three rivers of considerable size, called the Black Cart, the White Cart, and the Gryffe.

The number of proprietors is a little over 2600, and the number of occupants 1181. Of the whole acreage of R., there were, in 1857, under grass and hay 41,598 acres; and under rotation of crops 75,151, of which there were in wheat, 4764 acres, averaging 35 bushels 2¼ pecks per acre; barley, 417 acres, averaging 36 bushels 0½ pecks; oats, 17,097 acres, averaging 37 bushels 0¼ pecks; bere, 106 acres, averaging 34 bushels 2 pecks; beans, 1232 acres—pease, 8 acres, averaging 32 bushels 0¾ pecks; turnips, 3470 acres, averaging 16 tons 0½ cwt.; potatoes, 5729 acres, averaging 5 tons 11½ cwt.; summer fallow, 1840 acres. Of live-stock, there were horses, 3635; cattle, 22,398; sheep, 22,477; swine, 1761.

The old valued rent was £5764. The valuation for 1863—1864 was £340,987, being an increase over that of 1857 of £58,791, exclusive of railways, which in 1862-1863 were valued at £52,550. The parliamentary constituency, returning a member of parliament, in 1862, was 2313.

R. was the chief patrimony of the Stewards of Scotland, granted to them in 1404 by Robert III., since which time the eldest son of the reigning sovereign has borne the title of Baron of Renfrew.

RENFREW, an ancient royal, parliamentary, and municipal burgh, capital of the county of the same name, stands on the south bank of the Clyde, 5 miles west north-west of Glasgow. It contains an educational institution called the Renfrew Grammar School and Blythswood Testimonial, which was originally endowed by charter of Robert III., and is in part maintained by the Town Council. On the banks of the Clyde is a wharf, at which the Glasgow steamers touch. Silk and muslin fabrics are woven; and many of the inhabitants are employed in iron-works and in shipbuilding, which branches of industry have within recent years become important here. Pop. (1861) of royal burgh, 3412.

RENNEL, JAMES, a well-known English geographer, was born near Chudleigh, Devonshire, in 1742, and entered the navy as a midshipman at the age of 15, distinguishing himself under Admiral Parker at the siege of Pondicherry. At the age of 21, he left the navy, and enlisted as an officer of engineers in the East India Company's army, rising through the influence of his distinguished services under Clive to the grade of major. Soon afterwards, he was transferred to the post of surveyor-general of Bengal, an office more in keeping with his tastes. While serving in the army, he had prepared and published a *Chart of the Bank and Currents of Cape Agulhas* (1768), which attracted the general notice of geographers; and having retired from office (1782) with a pension of £600, he followed up this work by a succession of geographical works on India, the chief of which was *Memoir of a Map of Hindustan* (Lond. 1783), new editions of which appeared in 1788, 1793, and 1800, each of which merits to be considered a distinct work. But his geographical investigations took a wider scope, for in 1792 he published a *Memoir of the Geography of Africa*, from the communications of Major Houghton, and the relations of Ledyard and Hornemann; and in 1798, he aided Mungo Park in the arrangement of his travels, illustrating them by a map. R. had been elected a member of the Royal Society in 1788. The subject of the correctness of the ancient geographers being at that time much discussed, R., though wholly ignorant of Greek, undertook the vindication of Herodotus (whose works he became acquainted with through the medium of a translation), and published in 1800 his *Geographical System of Herodotus Examined and Explained*, a work of unrivalled merit, displaying as it does one of the grandest combinations of acuteness, sagacity, and research. A second edition was published in 1830. In 1814, appeared his *Observations on the Topography of the Plain of Troy*; and two years afterwards, *Illustrations (chiefly Geographical) of the Expedition of the Younger Cyrus, &c., and of the Retreat of the Ten Thousand.* After his death, which took place at London, 29th March 1830, there were found among his papers several MS. works, including the *Investigation of the Atlantic Currents and those between the Atlantic and Indian Oceans* (Lond. 1832), in the composition of which book he examined the logs of all the ships of

war and Indiamen which had traversed those seas for about 40 years previous, and reduced their observations to a general system; and *A Treatise on the Comparative Geography of Western Asia*, with an atlas, ancient and modern (Lond. 1831), a work of great labour and research, which had been prepared by the royal command, and the publication of which was partially defrayed at the king's expense. R was one of the most remarkable men of his time; his works exhibit throughout the most earnest perseverance and industry, sound judgment, and wonderful sagacity.

RENNES (*Redones* of the Romans, *Condate* of the Gauls), formerly the capital of the province of Bretagne, now the chief town of the dep. of Ille-et-Vilaine, is situated at the confluence of the rivers Ille and Vilaine. It is divided into the upper or new town and the lower or old town. It is surrounded by ancient walls, flanked with towers, beyond which lie extensive suburbs. Three bridges unite the two divisions of the town, the older portions of which lie on the left bank of the Vilaine, and are often exposed to serious damage from inundations. The most noteworthy of the public buildings are the cathedral—a large but inelegant specimen of early Gothic; St Peter's Church, with its two grand old towers; and the town-hall, a fine modern building. R. is the see of a bishop, and the seat of a High Court of Jurisdiction for Ille-et-Vilaine and several other adjacent departments, and has tribunals of First Instance and of Commerce. As the focus of main and branch lines of railway between Paris and the north-west of the empire, and commanding good river and canal navigation, R. is favourably situated for commerce; and in addition to the transport of the abundant farm-produce of the neighbouring districts, it carries on a considerable trade in its own manufactures, which include cotton and linen yarns, flannel stockings, lace, sail-cloths, earthenware, &c. Pop. (1862) 34,387.

RE'NNET consists of the inner lining of the true stomach (see DIGESTION) of the sucking calf, and depends for its use upon the acid gastric juice contained in it. It is prepared by removing the stomach from the animal as soon as killed, and scraping off the outer skin and all superfluous fatty matter. The membrane is then salted for some hours, and stretched out to dry. If perfectly dried, it will keep for a long time. When used, a small piece is taken and soaked in a little whey or water, and then added to the milk intended to be curdled.

RENNETT, the common name, not only in English, but, with slight modifications, in French, German, and other languages, of a class of apples, including many of the most beautiful and pleasant varieties. They are of very regular and nearly globose shape; their skin has generally a rusty tinge, and often a kind of unctuousness to the touch; their flesh is finely granular; and besides being sweet and agreeably acid, they have a peculiar aromatic flavour. They do not keep well. The trees have a very regular habit of growth, and are very suitable for dwarf standards. The name R. seems to be originally French—*Reinette*, Little Queen.

RENNIE, JOHN, an eminent civil engineer, was born at Phantassie, near East Linton, East Lothian, 7th June 1761. His preliminary education was obtained at the parish-school of East Linton, and supplemented by two years at Dunbar, where he was indoctrinated into pure mathematics. After being for some time a workman in the employment of Mr Andrew Meikle, celebrated in connection with the Thrashing-mill (q. v.), he proceeded to Edinburgh, where he attended the lectures on natural philosophy by Dr Robison, and those on chemistry by Dr Black (q. v.). Furnished with a recommendation from Professor Robison, he visited (1780) the works of Messrs Boulton and Watt at Soho, near Birmingham, and was immediately taken into employment by that eminent firm. Here his mechanical genius soon displayed itself; and so highly did Watt esteem R., that he gave him, in 1789, the sole direction of the construction and fitting-up of the machinery of the Albion Mills, London; and the ingenious improvements effected in the connecting wheel-work were so striking, that R. at once rose into general notice as an engineer of great promise. Abundance of mill-work now flowed in upon him, and the thorough efficiency of his workmanship greatly contributed to his fame. To this branch of engineering he added, about 1799, another the construction of bridges; and in this branch also his pre-eminent talent and ingenuity displayed themselves. The elegance and solidity of his constructions, the chief of which were raised at Kelso, Leeds, Musselburgh, Newton-Stewart, Boston, New Galloway (and at other places afterwards mentioned), were universally admired; R.'s greatest work in this department was the Waterloo Bridge over the Thames, said to be the noblest structure of its kind in the world, and it certainly combines in the happiest proportions the qualities of grandeur and simplicity. It was commenced in 1811, and finished in less than six years, at a cost of more than £1,000,000. Another of his works is the Southwark Bridge, which was built on a new principle, cast-iron arches resting on stone piers, and was finished in four years at an expense of £800,000. He also drew up the plan for the London Bridge, which, however, was not commenced till after his death. We have only space to enumerate the rest of his great engineering achievements: he superintended the execution of the Grand Western Canal in Somerset, the Polbrook Canal in Cornwall, the canal joining the Don and Dee in Aberdeen, that between Arundel and Portsmouth, and chief of all, the Kennet and Avon Canal between Newbury and Bath. The London Docks, the East and West India Docks at Blackwall, with their goods' sheds, the Hull docks, the Prince's Dock at Liverpool, and those of Dublin, Greenock, and Leith, were all designed, and wholly or partially executed under his superintendence. He also planned many improvements on harbours and on the dockyards of Portsmouth, Chatham, Sheerness, and Plymouth; executing at the last-mentioned port the most remarkable of all his naval works, the celebrated Breakwater. R. died October 16, 1821, and was buried in St Paul's Cathedral. R.'s great merit as an engineer consisted in his almost intuitive perception of what was proper to be done to effect the assigned purpose. Another striking characteristic of his works is the remarkable combination in them of beauty and durability. In this respect, R. had no rival; and though his works are frequently objected to on the ground of their expensiveness, yet their lasting qualities will in the end more than compensate for this. In person, R. was of extraordinary stature and herculean strength—characteristics which have for a lengthened period distinguished his family, and with reference to which numerous tales are still current regarding many of his relatives.

RENNIE, GEORGE, an eminent English civil engineer, and the eldest son of the preceding, was born in Surrey, January 3, 1791, and at the age of 16 entered the Edinburgh University, being placed

under the charge of Professor Playfair, in whose house Earl Russell, then an Edinburgh student, also at that time resided. After attending a course of classics, mathematics, chemistry, and natural philosophy, he returned to London in 1811, and commenced the practical study of engineering under his father. In 1818, he was appointed the superintendent of the machinery of the Mint, and at the same time aided his father in the planning and designing of several of his later works. After his father's death in 1821, R. entered into partnership with his younger brother, John (now Sir John Rennie), as engineers and machinery constructors; and during the existence of the firm, it carried on an immense business, including the execution of most of the works which had been planned by the elder Rennie, and the completion of those which he had left unfinished. Their operations included the construction of bridges, harbours, docks, ship-yard and dredging machinery, steam-factories, both in Great Britain and on the continent, and many of the great naval works at Sebastopol, Cronstadt, Odessa, Nicolaiev, and in the principal ports of England; they also made the coining machinery for the mints at Calcutta, Bombay, Lisbon, Mexico, and Peru; the biscuit, chocolate, and flour mills at Deptford, Gosport, and Plymouth; and furnished marine engines for the war-ships of England, Russia, France, Italy, Mexico, &c. Besides these multifarious labours, they built ships both of wood and iron, drained large tracts of land in the midland counties of England, and R. superintended the construction of several continental railways. He was elected a Fellow of the Royal Society in 1822, and was subsequently enrolled in similar societies at Dublin, Turin, Rotterdam, &c. He is the author of 'Experiments on the Strength of Materials,' 'The Frictions of Solids,' and 'The Frictions of Fluids,' published in the *Philosophical Transactions*. He has also contributed Memoirs to the *Transactions* of the Civil Engineers.—His brother, SIR JOHN, was knighted on the occasion of the opening of the new London Bridge (1831), one of their works, and retired from the firm in 1845. He subsequently practised as an architect; while his elder brother carries on, with the aid of his two sons, the business of the firm.

RENT, in Political Economy, is a term applied to the profits drawn from land, houses, or other immovable property, termed in England 'real property.' It is colloquially applied to these profits only when the property is hired by a tenant who pays for the use of it. It was long before a distinction was made between such letting and hiring and that of any other commodity, such as a ship or a wagon. But political economists found that there was a fundamental distinction, affecting large questions not only in political economy but in state politics. These are connected with the specialty that other profits, whether from the letting of articles or otherwise, arise out of the acts of those to whom the articles belong; but the rent of land is a fund that exists through external causes, over which the owner has no control, and in certain conditions *must* exist whoever may draw it. When 'the theory of rent,' as it was termed, dawned upon the economists, and was but partially seen, they developed it in different formulas, which appeared to be different theories, but in reality were crude forms, tending, though complicated in themselves, to the simple principle, that the pressure of population on the means of subsistence creates rent on those lands where the means of subsistence can most easily be produced. In an enlarging and aggrandising country like Britain, the phenomenon is in constant gradual operation; but it will be best illustrated by supposing an instance of sudden and extensive action. Suppose there is an island in which 1000 people find enough for their wants in the natural produce of its most fertile soil. Suddenly 500 people become added to the population, and an increase of the existing food to the extent of one-half is required. The shape in which this increase will take place will be competition, by the offer of an enhanced price for food, and that enhanced price will tempt people to bring under cultivation the inferior lands. The owners, however, of the old rich lands will not see their neighbours getting prices a third higher than themselves; they, too, will sell their produce at the market price, and the difference between this and the old value will be *rent*. It is of no moment, in the economic question of the existence of the element, that the owner of the rich soil does not let it; if he eats his bread cheaper than his neighbour, that is merely the form in which he derives the advantage of *rent*. The importance of this view, both in politics and economics, is that rent *must exist, and cannot be got rid of*. Whoever has at his command better land than the worst that is cultivated, holds rent. It is in vain, therefore, to think of destroying the 'monopoly,' as it is sometimes called, of landowners; it revives as naturally by an economic law, as water finds its level by a physical law. If you were to divide all the land in Britain to-morrow in equal portions among the inhabitants, the value of it would be greatly deteriorated by the change, but in time some patches would become more valuable than others, and worth 'rent' while the frugal and industrious would gradually be absorbing the portions of the idle and extravagant, and accumulating estates. In fact, to the mere consumer, it is of no moment who has the land, provided it is in the hands that can render it most productive. To this end, it is more profitable that the land of a country should be in the market, and obtainable by those who, being ready to give most for it, are able to work it to most profit. In France, where land is divided among the owner's descendants, the consequent breaking up into small patches, not necessarily in the hands of persons able or willing to cultivate them, is detrimental to the value of the land at large. On the other hand, an entail system, such as that which predominated, and still to a certain extent exists in Scotland, is detrimental, by keeping the land out of the market, and necessitating that it shall belong to a certain person, who has perhaps neither the ability nor the capital to turn it to its best purpose. In the struggle which terminated in the establishment of free trade in 1846, the 'theory of rent' was referred to with much alarm, and it was said that when grain was brought from abroad, a reversal of the action creating rent would occur, from the inferior lands falling out of cultivation. Some free-traders admitted this as a necessary evil, but others said that the expansion given to commerce would increase the demand for the produce of the soil, while the home-growers would have a monopoly from their vicinity. In fact, the increase of trade and riches has been so great, that the value of land has greatly increased since the establishment of free trade, and that although half our bread-stuffs come from abroad. The great increase has been in the rearing of butcher-meat, which the increased wealth of the people has enabled them to buy.

RENT, in English Law, is an incident to the tenure created between a lessor and lessee. It consists not necessarily of money, but may be a quantity of corn, or a peppercorn, or a flower. Where lands are held rent-free, it is usual for the landlord to reserve some nominal rent, merely as

an acknowledgment of tenancy. In the ordinary case of leases, a payment of a fixed sum of money is reserved annually for the benefit of the landlord. It is incidental to rent that the landlord can, if it is not duly paid, distrain the tenant's goods, or, indeed, any person's goods found on the premises; i. e., the landlord can seize these and sell them without any judicial authority, in order to pay the rent. No express agreement between landlord and tenant is necessary to give the landlord this power of distress. The rule is, that rent issues out of all and every part of the premises, and whatever goods are found on any part of the premises can be distrained by the landlord. Sometimes the owner of land gives a third party a right to a certain rent out of his lands, by way of security, and it is called a rent-charge; the party entitled to the rent-charge having power to distrain also for the rent, though having no other right to the lands. In Scotland, though the general rules as to rent do not substantially differ, the landlord's power of sequestration is not identical with the English power of distress. See LANDLORD AND TENANT.
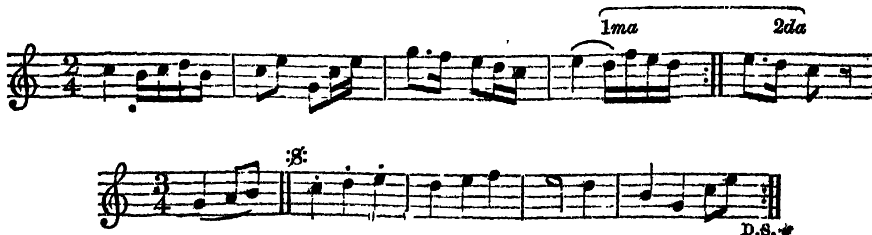
RE'NTON, a small town in the county of Dumbarton, and two miles north of the town of that name, on the right bank of the Leven. Smollett, the novelist and historian, was born in the neighbourhood, and is commemorated by a monument in the town. Pop. (1851) 2390; (1861) 2987, who are employed in the printing, dyeing, and bleaching works on the Leven.

RENUNCIA'TION, as a legal term, is the renouncing or abandoning of a right. In England, the term is used solely in reference to an executor who has been nominated in a will, but who, having an option to accept it, declines to do so, and in order to avoid any liability, expressly renounces the office. This he may do by letter addressed to the Court of Probate.—In Scotland, the term is also used in reference to an heir, who is entitled, if he pleases, to succeed to the ownership of heritable property, but, from the extent of the incumbrances, prefers to renounce the character of heir. So the renunciation of a lease in Scotland is used in the same sense as the surrender of a lease in England.

RENWICK, JAMES, LL.D., an American author and physicist, was born about 1785, and graduated at Columbia College, New York, in 1807. In 1820, he was appointed Professor of Chemistry and Physics in that college, a position he held until 1854. In 1838, he was appointed by the United States government one of the commissioners to explore the line of the boundary, then settled by the Ashburton treaty, between Maine and New Brunswick. In addition to his collegiate duties, he wrote the biographies of Robert Fulton, David Rittenhouse, and Count Rumford, in Sparks's *American Biography*; a *Memoir of De Witt Clinton* (1834); *Treatise on the Steam-engine* (1840—1841). His text-books, *Outlines of Natural Philosophy* (1832) and *Outlines of Geology* (1838), were the first works of their kind published in the United States, and, with his other educational works, have passed through numerous editions.

REPAI'RS is the legal as well as popular term to denote the repairs done to a house or tenement by a tenant or landlord during the currency of the lease. In England, the burden of repairs is at common law thrown on the tenant, so that unless the lease expressly say that the landlord is to do the repairs, the tenant will be bound, but generally the lease states who is to do the repairs; and it is only ordinary repairs that the tenant is bound to do. In the lease of farms, the tenant is bound only to keep the house in repair, and not the out-buildings, though he is bound to keep the fences in repair. If the landlord is bound to do the repairs, and fails to do them, the tenant is not entitled to quit the premises on that account, though he will be entitled to sue the landlord for damage caused by the want of repairs. In Scotland, the landlord is bound at common law to put the premises into tenantable repair at the commencement of the lease. The tenant is then bound to keep them in ordinary repair, but not to keep them in repair where some hurricane or extraordinary cause has done injury.

REPEA'T, in Music, a character indicating the repetition of the part or strain to which it applies. It consists of two perpendicular lines through the staff, with dots before them and between the lines of the staff— placed at the close of the strain to be repeated. When a series of notes has to be repeated from the beginning of the piece, this sign is inserted at the place where we have to return to the beginning. But when the repetition is not from the beginning of the piece, a reversed repeat must be placed at the point where the repetition begins, the passage to be repeated being enclosed by the two signs. When the following strain is also to be repeated, we have the dots placed on both sides of the repeating sign When a passage of some length is to be repeated, with an alteration at the end, a curved line with the figure 1, 1*ma*, or *prima volta* (Ital. first time) is placed over the part which is to be altered, the sign of the repeat follows, and then the altered termination with 2, 2*da*, or *seconda volta* (Ital. second time) placed over it.



The words *Da Capo*, abbreviated D.C. (Ital. from the beginning), indicate that a piece is to be repeated from the beginning. But if that repetition is only to extend to a particular point, at which the movement or piece finally closes, that point is indicated by the word *Fine* (Ital. end), or the letter F. If, however, the repetition is to begin, not from the commencement of the piece, but from another point,

the sign 𝄋 is placed over the point, and the words *dal segno*, abbreviated D.S. (Ital. from the sign), are used to indicate the point after which the repetition is to begin.

REPETI'TION, in Scotch Law, means the repayment of money which had been received by mistake or ignorance. The form of action by which money is so recovered was, in the Roman law, called *condictio indebiti*, and the law of Scotland adopts the same expression. The maxim is, that if money has been paid under some mistake as to the law, it cannot be recovered; but if it was paid under a mistake as to a matter of fact, then it may be recovered. In England, the same doctrine holds, and the action is called an action for money had and received.

REPLEA'DER, in English Law, is a right to plead again, or deliver a fresh pleading, in consequence of the issue which had been joined not meeting or exhausting the real point in dispute. This right is much abridged, in consequence of the liberality now used in amending the record.

REPLE'VIN, in English Law, is a form of action by which goods which have been seized under an illegal distress are taken back (security being given to the amount for which the goods were distrained), and the action of replevin commenced, to try the legality of the seizure.

REPLICA'TION, in the English Common Law, means the pleading of the plaintiff in answer to the defendant's plea. The plaintiff's first pleading is the declaration, which is answered by the defendant's plea, and which in turn is answered by the plaintiff's replication.

REPO'RTING, Parliamentary. Accounts of single speeches, and, at times, of entire debates in the English parliament, have come down to us from a very early period, and in the voluminous work entitled the *Parliamentary History of England*, we possess the most valuable historical work in our language. The earlier volumes of the Journals of the House of Commons contain short notes of speeches, which the clerks made without the authority of the House; but all the later volumes record nothing but the votes and proceedings—the *res gestæ*, in fact. Sir Symonds d'Ewes, who may be considered our first parliamentary reporter, has left us a journal of Queen Elizabeth's parliaments. The session of 1621 was also reported from notes taken by a member. The Commons' Journals contain notes of speeches in the parliaments of James I. and James II. Rushworth, assistant-clerk in the Long Parliament, 1640, took down in a species of shorthand any speech of importance, and furnished Charles I. with a copy of the king's own speech when he made the attempt to seize the five members. His account of *Remarkable Proceedings in Parliament* forms one of the most valuable portions of his *Historical Collections*. We are also indebted to Thurloe and Gray for notices of what occurred in parliament. During the reign of William III., a member now and then sent a copy of his speech to the newspapers, for printing which, however, they were sometimes called to account. In the reign of Queen Anne, a monthly pamphlet, called the *Political State*, gave an outline of the debates in parliament. In the reign of George I., the *Historical Register*, published annually, professed to give reports of parliamentary speeches. The *Gentleman's Magazine* began a monthly publication of the debates, the number for August 1735 containing a report of the debate in the House of Lords on the previous 23d January. Cave, the publisher, continued the practice in succeeding numbers, and his systematic proceedings are thus described by Sir John Hawkins: 'Taking with him a friend or two, he found means to procure for them and himself admission into the gallery of the House of Commons, or to some concealed station in the other house, and there they privately took down notes of the several speeches, and the general tendency and substance of the arguments. Thus furnished, Cave and his associates would adjourn to a neighbouring tavern, and compare and adjust their notes; by means whereof, and the help of their memories, they became enabled to fix at least the substance of what they had lately heard and remarked. The reducing this crude matter into form was the work of a future day and an abler hand—Guthrie, the historian, whom Cave retained for the purpose.' There was, however, no publication of the debates during the sitting of the Houses; parliament was always prorogued before anything said in the course of the session was given in the magazine. At first, the names of the speakers were cautiously indicated by the first and last letter only, and in many cases the speaker's name was wholly omitted. Growing bolder by degrees, Cave printed the names at length. The House of Commons soon took the alarm. The publication of the debates of either House had been repeatedly declared to be a high breach of privilege. Sir Symonds d'Ewes gives us a resolution of the Lower House in the 31st Eliz. 1588, that 'speeches used in this House be not any of them made or used as table-talk, or in any wise delivered in notes of writing to any persons whatever, not being members of this House.' In 1698, the Lords agreed to a standing order, which is still unrepealed, declaring 'that it is a breach of the privilege of this House for any person whatsoever to print, or publish in print, anything relating to the proceedings of the House, without the leave of this House.' The Commons followed up several previous resolutions to the same effect, by ordering, in 1728, 'that it is an indignity to, and a breach of, the privilege of this House, for any person to presume to give, in written or printed newspapers, any account or minute of the debates or other proceedings; that upon discovery of the authors, printers, or publishers of any such newspaper, this House will proceed against the offenders with the utmost severity.' In 1738, Speaker Onslow called the attention of the House to the breach of its standing orders by Cave and others. Sir Thomas Winnington exhorted the Commons not to be less jealous of their privileges than the other House, which had lately punished some printers for publishing their protests. 'What will be the consequence,' he asked, 'if you allow these reports to go on unchecked? You will have the speeches of this House every day printed, even during your session, and we shall be looked upon as the most contemptible assembly on the face of the earth.' The result was another thundering resolution against the publication of debates 'either while parliament is sitting or during the recess,' and a threat to proceed against offenders with the 'utmost severity.' The reports, notwithstanding, still appeared, but under the disguise of 'Debates in the Senate of Lilliput,' in the *Gentleman's Magazine;* and 'Debates in the Political Club,' in the *London Magazine*. The celebrated Dr Johnson was employed by Cave in the composition of his parliamentary debates, and the reports from 1740 to 1743 are held to have been entirely prepared by him; sometimes with the assistance of Guthrie, a hack-writer, who had a good memory, and used to bring home as much as he could recollect from the House; and sometimes, according to Boswell, with no other aid than the names of the orators and the side they took. When it was observed to Johnson that he dealt out reason

and eloquence pretty equally to both parties, he remarked: 'I took care that the Whig dogs should not have the best of it.' It was not till 30 years later that the parliamentary debates descended from the magazines to the newspapers. The latter had, however, for some time resolved to report the debates (Woodfall's *Junius*, iii. 345), and they took advantage of the popular excitement arising out of the Luttrell-Wilkes election for Middlesex, to try the right of the House to interdict the publication of its proceedings.

The ever-memorable contest between parliament and the press began at the close of the year 1770. The House of Commons followed up another solemn threat by prompt action. Two printers, Thompson and Wheble, were ordered to attend at the bar, and, upon their contempt, were ordered into custody. On the 12th of March 1771, complaint was made against W. Woodfall, printer of the *Morning Chronicle*; J. Miller, of the *London Evening Post*; and four other printers of London daily papers, for printing the proceedings of the House. The debates were unusually violent; there were 23 divisions; and the House did not adjourn until four A.M. The printers were ordered to attend. Some surrendered, and, on asking pardon on their knees at the bar, were discharged. Miller, not surrendering, was ordered into the custody of the serjeant at arms. His messenger arrested Miller within the precincts of the city of London, and was immediately given into custody by Miller for assault, and carried before the Lord Mayor, the Right Hon. Brass Crosby. The deputy serjeant-at arms attended before the Lord Mayor, and explained the circumstances; but his lordship declared the Speaker's warrant illegal, discharged Miller from custody, and committed the messenger for assault. Wheble and Thompson had been carried respectively before Aldermen Wilkes and Oliver, who immediately discharged them, and bound them over to prosecute, and the Speaker's messenger to answer a charge of assault and false imprisonment. The House of Commons was furious. It had had enough of Wilkes, but ordered the attendance of the Lord Mayor (a member of the House) in his place, and also of Alderman Oliver. The aldermen of London attended the House, and pleaded their own cause, alleging that their charters exempted the citizens from any law process being served upon them except by their own officers. The House ordered its various resolutions to be read, prohibiting the reporting of its proceedings by any, even its own members, and then committed Alderman Oliver to the Tower. The Lord Mayor, who was suffering from gout, was excused from further attendance that day, but Wilkes was ordered to attend at the bar on the 8th of April. The defiant alderman was ready for the fray, but the House evaded the meeting by adjourning from the 7th to the 9th. The Lord Mayor, on the 27th, was sent to join Alderman Oliver in the Tower. The city of London loudly protested against the arbitrary proceedings of the House, and the whole country responded to the appeal. The power of parliament to imprison ceases at the end of the current session, and on the day of prorogation, July 23, the Lord Mayor and Alderman Oliver marched out of the Tower in triumph, and at night the city was illuminated. A few days afterwards, the Speaker's messenger who had arrested Wheble was tried at Guildhall for the assault, found guilty, fined 1s., and imprisoned for two months in the Compter. Next session, the House of Commons tacitly acknowledged itself beaten. The printers defied the House, continued to publish their proceedings, and slept, notwithstanding, secure in their beds. In a short time, the House of Lords also conceded the point. The victory was complete, and no attempt has since been made to restrain the publication of the debates and proceedings of parliament. The resolution affirming that it is a high indignity to, and 'notorious breach of, the privileges of the House to publish the debates,' still remains unrevoked on the Journals. Although debates are now daily cited in parliament from printed reports, and galleries have been constructed for the accommodation of the reporters, yet for some years after the triumph of the press, the gallery of the Lower House was occasionally shut during debates. During the American war, the public were more than once excluded from the gallery for a whole session. It is still in the power of any member, who may call the Speaker's attention to the fact that 'strangers are present,' to exclude the public and the reporters from the House. This power has frequently been exercised during living memory, but on such occasions some one or more members who have dissented from this course have taken notes of the speeches, and have avowedly sent them to the newspapers.

The old machinery of newspaper reporting was susceptible of immense improvement. One of the Woodfalls (a brother of the Woodfall of Junius) had so retentive a memory that he went by the name of 'Memory Woodfall.' When editor of the *Morning Chronicle*, he used to listen to a debate in the gallery, and write it out next day, the taking of notes being at that time forbidden. The employment of only one reporter for the whole night necessarily caused great delay in the publication of the paper, Woodfall's journal sometimes not being ready until nine or ten o'clock at night. The first great improvement was made by Mr Perry, a native of Aberdeen, who succeeded Woodfall in the management of the *Morning Chronicle*. He established a corps of parliamentary reporters to attend the debates of both Houses every night in succession. He thus brought out the night's debate on the following morning, anticipating his rivals by ten or twelve hours. The superior excellence of the reports thus obtained, as well as their more rapid publication, soon made the new system universal. The improvement in the reports of the debates from the period of the American war until the year 1815, was but gradual. At the close of the war, however, public attention being directed with almost exclusive anxiety to domestic affairs, the publication of parliamentary debates became an object of national importance, and in the course of a few years assumed its present full, detailed, and accurate character. Increased facilities for the discharge of their important and arduous duties were from time to time given to the reporters. Formerly, they had no means of entering the Strangers' Gallery except those which were common to the public generally. On days when an interesting debate was expected, they were obliged to take their places on the stairs early in the forenoon, and, after standing there for many hours, to depend for their chance of getting in by battling their way in the crowd when the door opened. It happened one night during Mr Pitt's premiership that the gallery was more than usually thronged in expectation of an important speech from the minister. The reporters, unable either by force or entreaty to obtain even tolerable accommodation, took counsel together. They left the House; and next morning, 'instead of the rounded periods of the minister, there appeared nothing but one dire blank, accompanied by a strong comment on the grievance in which it had originated.' Mr Speaker Abbott, not, as it was believed, without concert with the vexed and aggrieved minister, immediately

directed the appropriation of the uppermost bench of the gallery to the reporters' exclusive use, with a door in the centre, by which they alone had a right to enter. Soon after, a small 'Reporters' Room' was added. The Lords followed the Lower House in providing accommodation for the press. During the debates on Catholic emancipation, a small space below the bar was railed off for them, and a session or two afterwards, a seat was formally set apart for the reporters. When the Houses of Parliament were destroyed by fire in 1834, an exclusive gallery was allotted to the reporters in both chambers of the temporary structure in which the legislature held its sittings. This arrangement has been continued in the splendid new Palace of Westminster, in which the two Houses now hold their deliberations. In the House of Lords, the Reporters' Gallery faces the throne and the woolsack, and is one of the most prominent internal features of the edifice. Complaint having been made of the inaudibility of the speakers, their lordships appointed a select committee, examined the reporters, the architect, &c., and took all possible measures to make themselves heard in the gallery. In the House of Commons, the Reporters' Gallery is behind the chair. Both Houses provide them with rooms and other conveniences for transcribing their notes. In the Lower House, one of the committee rooms has been set apart for their use; and a room occupying the site of the old Star Chamber has recently been given to them for a club-room.

The modern process of parliamentary reporting may be best described by a sketch of the arrangements made by the *Times* newspaper for a due and expeditious transcript of the debates. The *Times* parliamentary corps is sixteen in number, who are equally divided between the two Houses. When one House rises, the entire corps is available for duty in the other, so long as it sits. It thus happens that one of a series of reporters is constantly in the gallery of the Lords, and another in the Commons. Like sentinels, they cannot leave their places until they are relieved by a colleague, but this relief takes place with unvarying regularity every quarter of an hour. When both Houses are sitting, each reporter has thus an hour and three-quarters for the work of transcribing his shorthand notes for the printer—a sufficiently short interval, when it is remembered that a moderate speaker will fill three-quarters of a column, and a rapid speaker not unfrequently a column, in a quarter of an hour. When his turn again comes round, each reporter must be ready to resume the duty of note-taking, and afterwards that of transcription for the press. By maintaining this quick succession of reporters, the process of writing for the press is never interrupted until the whole debate of the evening in both Houses is in the hands of the printer. A long speech may thus be said to extend from the mouth of the speaker to Printing House Square. A part will be wet with ink on the reporters' table; one section will be travelling over Westminster Bridge, and another over Blackfriars Bridge, in swift relays of cabs; a portion, becoming larger every few minutes, will be in the hands of the compositors, and a proof-sheet ready printed, of the earlier passages, will be on the desk of the editor. On some few occasions, when a minister has been more than usually anxious to secure the accurate publication of important statements, a proof impression of a verbatim report of nearly the whole of his speech has been placed in his hands, to his extreme astonishment, as soon as he resumed his seat. The mechanical arrangements of the printing-office are equally designed to secure expedition and accuracy. The parliamentary system of the other morning newspapers resembles that of the *Times*, but as the numerical strength of their corps does not quite reach that of the leading journal in any case, and sometimes falls considerably below it, the periods of note-taking and 'relief' proportionately vary. A still more startling application of modern science exists in the introduction of the electric telegraph into the Houses of Parliament, by means of which portions of parliamentary speeches are in the hands of newspaper editors at Birmingham, Liverpool, Edinburgh, &c., and may be read by the public in those towns, before the speaker has resumed his seat.

No parliamentary reporter now thinks of relying upon his memory: all take notes, and the great majority write some system or other of Shorthand (q. v.). A few years ago, the object desired by newspaper proprietors was not a literal report, but what may be called the spirit of a speech—a faithful abridgment, in fact, of the sentiment, matter, and style of the speaker. But parliamentary reports may now be said to err on the side of diffuseness rather than brevity, the debates of a single evening not unfrequently occupying between 20 and 30 columns of small type. It is well that the chief speeches should be reported with a fulness and correctness that astonish every one who hears them delivered; but the tendency to report at almost the same length inferior speeches, containing the same ideas in more diluted language, has gone far to make the parliamentary debates less readable of late years.

It only remains to say a few words respecting *Hansard's Parliamentary Debates*, the only publication since the *Mirror of Parliament* which professes to give all the speeches fully and accurately. We have already pointed out (see HANSARD) that no staff of reporters is engaged for this work, and that when members quote *Hansard*, for the purpose of convicting an opponent of inconsistency, they are fully aware they are citing from the report of some daily journal; but they take it for granted the passage has been specially brought under the notice of the speaker by the editor of that publication, and it is therefore presumed that the report is authentic. *Hansard*, however, has no representative in the Gallery, and it is sometimes said that members assume so much licence to correct, add, and erase, that the historical value of this record is materially lessened. The historian of party struggles, who, when he approached the year 1805, had to take leave of the *Parliamentary History*, remarks: 'It requires no little resolution to sink a shaft into that solid mass of mixed ore and rubbish which succeeds it, viz., *Hansard's Parliamentary Debates*—and which, however valuable for the purpose of detecting individual inconsistencies, will perhaps render the debates of this century as little known as those of the time of Queen Anne. These voluminous reports of unimportant debates will in time form rather an embarrassing monument of the vanity of our senators.' See Cooke's *History of Party*, vol. iii. p. 458.

The constitutional importance of the present system of parliamentary reporting can scarcely be overrated. It enables the entire people to be present, and in a manner to assist in the deliberations of parliament. The English orator addresses, indeed, not only the assembly of which he is a member, but, through it, the civilised world. Publicity has become one of the most important instruments of parliamentary government. Long before a measure can be adopted by the legislature, it has been approved or condemned by the public voice; and, living and acting in public, parliament under a free representation has become as sensitive

to public opinion as a barometer to atmospheric pressure. 'No circumstance in the history of our country—not even parliamentary reform—has done more for freedom and good government than the unfettered liberty of reporting; and of all the services which the press has rendered to free institutions, none has been greater than its bold defiance of parliamentary privilege, while labouring for the interests of the people.'—See May's *Constitutional History of England;* also Knight Hunt's *Fourth Estate:* Andrews' *History of British Journalism;* a few papers in *Chambers's Journal* in 1834 (which the last-cited author declares to be among the best contributions to the history of the newspaper press); Wade's *British History;* Dod's *Parliamentary Companion,* 1864.

In continental countries enjoying constitutional government, official short-hand writers are usually appointed by the government to report the debates, and these reports may, under certain restrictions, be transferred to the columns of the press. In the United States, particular speeches delivered in Congress are fully reported and generally read; but complaints are made by members that the New York and other journals do not give sufficient space to a report of the proceedings of Congress.

REPOUSSÉ, a French term applied to a peculiar method of ornamentation in metal-work, resembling embossing; but the effect is produced by hammering up the metal, which is generally thin, from the back, and when a rude resemblance of the figure to be produced is thus formed, it is worked up by pressing and chasing the front surface. The finest specimens of this art are of the *cinque-cento* or 16th c. period, by Benvenuto Cellini. They were generally executed in the precious metals, but copper, iron, and steel were also used, and consisted of cups, vases, shields, &c. Cellini carried the art to France, where it has of late been much developed. A. Vechte, a Frenchman, at present settled in England, has again brought it to a degree of excellence nearly equalling that of the Italian school in the 16th century. His works exhibited in the Exhibitions of 1851 and 1862 are amongst the most remarkable art-productions of the present century. Much common repoussé work is done in Birmingham, in the soft white metals, such as pewter and Britannia metal; and as these are easily worked, and can afterwards be electroplated, so as to hide the quality of the material, they are in considerable demand. After they are hammered up from the inside, they are filled with liquid pitch, and set by until it becomes solid. Then they are modelled and chased on the surface, the pitch forming a support, which prevents the tools from pressing down more than is required. The pitch is afterwards melted and drained out, and a subsequent boiling in an alkaline lye completely cleans the work. Tea and coffee pots are the chief articles made in this manner.

REPRESENTATION, in Politics, the function of the delegate of a constituency in a legislative or other public assembly. The principle of representation, even where not directly recognised, must be presumed to have existed to some extent in all governments not purely democratic, in so far as the sense of the whole nation was considered to be spoken by a part, and the decisions of a part to be binding on the whole. The constitution of ecclesiastical councils, in which an express or implied representation is necessarily involved, doubtless conduced to the application of a similar principle to national assemblies; but it is in the exigences of feudalism that we trace the beginnings of an avowed and regulated system of political representation. The feudal superior who had to levy aid from his vassals, summoned a limited number of them to attend him, and confer regarding the required aid. The earliest complete system of representative institutions is to be found in the parliament of the Sicilies under the Swabian kings; but Britain is the only country in which a representative feudal assembly ripened into a legislative. As early as the reign of Henry III., we find the knights of the shire elected by the 'men of the country,' probably the king's military tenants, to consider, in the stead of each and all of them, what aid would be granted to the king for a proposed expedition into Gascony. Representatives of the burgesses were soon afterwards summoned, and were permanently ingrafted on parliament by Edward I. In Scotland, representative burgesses formed a part of the national assembly from the time of Robert Bruce's famous parliament at Cambuskenneth, in 1326; but down to a comparatively late period, the whole barons or freeholders of the country formed part of the king's council, and were entitled to attend in person. A system of representation among them was attempted to be introduced by James I. on his return from England, but became practically inoperative; and it was not till 1587 that the representatives of the small barons came to form part of the parliament. The progress of society has led to great changes in the constitution of the elective body, the most sweeping being those introduced by the Reform acts. See PARLIAMENT, and REFORM, PARLIAMENTARY.

An important question naturally arises connected with the subject of representation: Is the delegate the mere mouthpiece of his constituents, who must give effect to all their opinions and interests, or is it his duty to exercise his trust in the first instance for the general welfare of the nation? The former idea of representation was doubtless the earlier one; but it cannot be easily vindicated on any proper theory of government; and it is now the generally recognised doctrine among English statesmen, that a member of the House of Commons is bound to the entire nation by ties higher than those which bind him to his constituents, and that he ought to support such measures as he judges most beneficial to the country, even at the risk of prejudicing the immediate local interests of the body which sends him. It is therefore not very easy to reconcile with sound principles the usage which obtains so largely of demanding pledges from candidates for representation as to how they are to vote on every public question that is likely to come before them. Yet there is practically a difficulty in preventing a system of representation from becoming one of mere delegation, so long as the constitution gives to the electors the power of making their vote depend on any conditions which they may think fit to attach to it.

Most speculative politicians of the present day consider a representative government of some description as the best ideal type of government; but all repudiate the idea of an inborn right in all citizens to participate, and still more to participate equally, in the right of choosing the governing body. Any very extensive suffrage must of necessity lead to the predominance of mere numbers over intelligence, while a very limited suffrage has been objected to as doing away with the benefits which the community at large are presumed to draw from a participation in public functions. Several intelligent political writers, while advocating a widely extended suffrage, have proposed a graduation of that suffrage by giving to each individual a number of votes corresponding, as far as practicable, to his intelligence, property, or social position. This is doubtless the perfect ideal of representative

government, and the chief question is, By what test can the best approximate estimate of social value be arrived at? Two different schemes for this purpose have been proposed by Mr J. S. Mill and Professor Lorimer respectively—the former founded mainly on intelligence as indicated by instruction, and the latter on wealth and social position. The attention of political writers has also lately been directed to the question of the representation of minorities, who at present are not even allowed a hearing in representative assemblies. The most feasible scheme for this purpose is perhaps that of Mr Hare, which has the approval of Mr J. S. Mill, by which those who do not like the local candidates, are to be allowed to fill up voting papers by a selection from the names of any persons on the list of candidates, with whose general political principles they sympathise. This system, along with its other advantages, would, it is supposed, bring into parliament numerous men of able and independent thought, who, by the present system, refrain from offering themselves, as having no chance of being chosen by the majority of any existing constituency. See J. S. Mill's *Considerations on Representative Government* (London, 1861); Professor Lorimer's *Political Progress not necessarily Democratic* (1857); and Hare's *Treatise on the Election of Representatives* (1860).

REPRIE'VE (Fr. *reprendre*, to take back) is the suspension of punishment for a crime, and is used chiefly in connection with capital crimes. The power of suspending all sentences at any time is vested in the crown at discretion. There are also several grounds on which the judge or a court reprieves a sentence. One is, where the judge is not satisfied with the verdict, or is doubtful of the validity of the indictment, in which case he reprieves the sentence, in order to give time for some application to the crown. Moreover, an ordinary ground of reprieve is acted on generally as a matter of course, whenever the prisoner is a pregnant woman, and pleads that fact, in which case it is considered only merciful towards the offspring to put off the execution of the sentence until after her delivery. This was the law of ancient Rome; and nothing connected with the memory of Queen Mary is more detestable than the bloody proceeding in her reign of burning a pregnant woman in Guernsey, when the child, which was born at the stake, was cast into the fire as a young heretic. When a woman pleads her pregnancy as a reason for reprieve, the practice is for the judge to empanel a jury of 12 matrons, or discreet women, to inquire into the fact, and if they bring in a verdict of 'quick with child,' execution is stayed, as a matter of course, from session to session until the delivery. Another cause of reprieve is the insanity of the prisoner, for if before execution it appear the prisoner is insane, whether the insanity supervened after the crime or not, the judge ought to reprieve him.

REPRI'SAL is the retaking, from an enemy, goods which he has seized, or the capture from him of other goods, as an equivalent for the damage he has wrought.—A *reprise* is a ship recaptured from an enemy or pirate. If recaptured within 24 hours of the hostile seizure, she must be wholly restored to her owners; if later, she becomes the lawful prize of her recaptors.

REPRISALS, LETTERS OF, the same as LETTERS OF MARQUE (q. v.).

REPRODU'CTION, or the propagation of organised beings in the animal kingdom, is accomplished by three different processes. The first of the three processes by which the multiplication of individuals takes place consists in the division of one organism into two, each of these, again, dividing into two others, and so on. This is termed *reproduction by fission*. The second mode of increase consists in the formation of a bud at some part of the body of the animal. This bud gradually approximates in form to that of the parent from which it springs; its pedicle or stem gradually disappears; and the liberated bud ultimately assumes a perfect form, resembling in all respects the parent from which it sprung (*gemmation*). The third mode is far the most complicated. In it the new organism results from a series of changes occurring in an impregnated egg or *ovum*. For this process, distinct sexual organs, both male and female (which, however, may be associated in the same individual, although in all the higher animals they occur in distinct individuals), are required; a female organ for the production of cells termed 'germs,' and a male organ for the production of certain cells termed 'spermatozoa.' It is from the union (either within or without the body) and the mutual action of these cells—the germ and the spermatozoon—that the impregnated ovum results. The new resulting body is altogether different from either of the cells which took part in its production. This is the ordinary form of reproduction in all the higher animals, and may be termed *true generation*, in contradistinction to the previous forms of *reproduction by multiplication*. The terms *Digenesis* and *Heterogenesis* have been applied by recent physiological writers to designate the form of reproduction in which the contact of germs and spermatozoa gives rise to fecundation; while the terms *Monogenesis* and *Homogenesis* have been similarly applied to the cases in which non-sexual reproduction takes place by fission or gemmation.

Fissiparous multiplication is best illustrated by a reference to the Infusoria. It may be either longitudinal, as commonly occurs in *Vorticella;* or trans-



Fig. 1.—Longitudinal Fission of Vorticella.

verse, as occurs in *Stentor;* or indifferently longitudinal or transverse, as in *Chilodon, Paramecium,* &c. The joints of tape-worms multiply in this manner, and when sufficiently developed, become free. Amongst some of the Annelids, or true worms, reproduction of this kind in a somewhat modified form is also observed. This was first noticed in a *Nais* by the Danish naturalist Müller, by whom it was regarded as a rare and accidental occurrence. The more recent researches of De Quatrefages and Milne-Edwards have, however, shewn that the process is one of far more significance than Müller supposed. In the genus *Syllis*, De Quatrefages noticed the following appearances: When one of these worms is about to reproduce itself by fission, a number of rings become developed at its posterior extremity, and there is a notch or groove between the first of these rings and the part in front of it. The first ring soon becomes organised into a head provided with eyes and antennæ. The two annelids, parent and offspring, continue, however, to be united by the skin and intestine in such a manner that the latter animal lives solely upon the food swallowed by the former. During this period, each possesses independent life, for a struggle may often be observed between the two, each wishing to go its

own way. After the lapse of a certain time, the body of the offspring becomes distended with ova in some cases, and with spermatozoa in others, while neither of these structures is to be seen in the body of the primary animal. Complete division is at length effected, and the offspring is free. In a few days, however, their bodies burst, from the distention caused by their contents. Ova and spermatozoa are thus diffused through the water, and fecundation thus takes place. In the genus *Myrianida* (*Autolytus*, according to Grube's classification), Milne-Edwards has seen no less than six new individuals (instead of a single one, as in *Syllis*), formed in gradual succession, one before the other, between the two terminal segments of the original body. Each of these new individuals, as it arrived at maturity, and acquired the external form (in reduced dimensions) of the parents, was found to be possessed of reproductive organs, of which the original animal

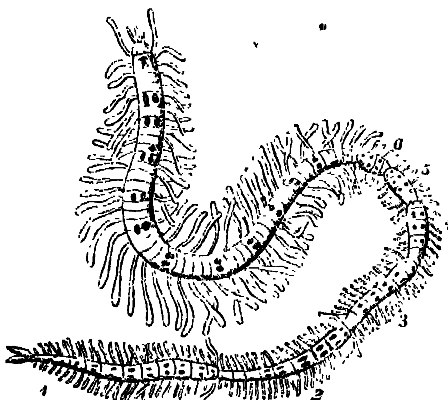


Fig. 2.—*Myriana*, with six new individuals formed on it.

was totally devoid. The youngest and smallest individual is the most remote from the tail.

In these instances, multiplication by division occurs as a *natural* process, but there are many cases in which *artificial* division gives rise to multiplication. Bonnet having found that a certain kind of small worm, when cut in two, reproduced a tail at the cut extremity of the cephalic half, and formed a head upon the caudal half, increased the number of sections, and finally succeeded in dividing one worm into twenty-six parts, almost all of which acquired a head and tail, and thus became distinct individuals. Corresponding results may be obtained by dividing a planaria or actinia into many segments.

Reproduction by gemmation is a phenomenon of very frequent occurrence in the lower departments of the animal kingdom. In the lowest of the animal subkingdoms, the PROTOZOA, it occurs in the *Rhizopoda*—viz., in the *Foraminifera;* in the *Spongiæ*, being probably the most common form of reproduction in sponges; and in the *Infusoria*, as, for example, in *Vorticella*. In the CŒLENTERATA, it is of almost general occurrence in the classes *Hydrozoa* and *Actinozoa;* and in the MOLLUSCOIDS it occurs in *Polyzoa* and in *Tunicata*. In the accompanying figure (fig. 3), the process is shewn as it occurs in the freshwater hydra (the type of the *Hydrozoa*) and in Vorticella. If some hydras are kept for a few days in a glass of their native water, knot-like excrescences will be seen on their bodies. These are the buds or *gemmæ*, which rapidly enlarge, and each by degrees assumes the appearance of a young hydra, tentacles appearing about the mouth, just as in the original animal. For some time, a portion of the food (minute infusoria, entomostraca, &c.), caught and digested by the parent, passes into the body of the offspring;

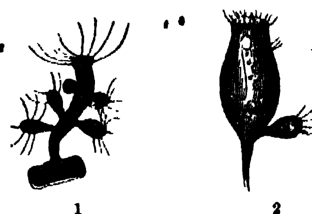


Fig. 3.

1, Gemmation in Fresh-water Hydra; 2, Gemmation in Vorticella.

but when the tentacles are sufficiently developed, the young polype catches food for itself, and when it is sufficiently matured to commence an independent existence, the connecting pedicle gives way, and the young animal is free and independent.

It must be distinctly understood, that the fact of an organism reproducing itself by fission or gemmation does not by any means exclude the possibility that it may also be reproduced by fecundated ova. That this is the case, is indeed shewn in the instance of the worm *Myriana*, and a very large number of corroborative cases might be readily given.

In *true generation*, two special organs are required —a female organ for producing the germ-cell or ovum, and a male organ for producing the sperm-cell or spermatozoon; and each form of generative apparatus consists of two parts, of which one is a formative organ—in the female, termed an *ovarium*, or ovary, and in the male, a *testis*—in which the reproductive cells are formed, and which is essential; and an efferent duct, by which the products of secretion are carried off. The male and female organs may exist in separate individuals, or they may co-exist in the same individual, giving rise to the condition known as *Hermaphroditism* (q. v.). The former condition is termed *bisexual* or *diœcious*, and the latter *unisexual* or *monœcious*. For a general description of the changes which take place in the impregnated egg, the reader is referred to the article DEVELOPMENT OF THE OVUM.

We shall conclude with a brief notice of the mode or modes of reproduction in the different classes of animals, beginning with the lowest.

In the subkingdom PROTOZOA, reproduction takes place by all three modes, viz., by fission, gemmation, and impregnated ova; but fission is here the predominating form; and it is only in the Infusoria that there is undoubted evidence of true generation by ova and spermatozoa. It is worthy of notice, that in the Infusoria, propagation is effected in no less than four different ways—viz., by the three processes already described in this article, and by a process known as 'encystation.' See INFUSORIA.

In the subkingdom CŒLENTERATA, it is found that both the Hydrozoa and the Anthozoa multiply by gemmation, by a true reproductive process, and in a few genera by fission.

In the ECHINODERMATA, fission has been observed in one class, the Holothuroidea, which, moreover, have distinct sexual organs combined in the same individual. In the other classes—the Echinoidea, Asteroidea, and Crinoidea—the sexes are separate, and generation only takes place by the union of germs or ova and spermatozoa.

In the ANNELIDA, true generation takes place, although, as has been already shewn, multiplication sometimes takes place by fission. In the lower *Mollusca* or *Molluscoids*, multiplication takes place

by gemmation and by true generation; while in the higher *Mollusca*, multiplication only takes place by true generation.

In the ARTICULATA—Insects, Crustaceans, &c.—distinct generative organs are always present, and, excepting in one class of Crustaceans—the Cirrhopoda—the sexes are distinct.

In the VERTEBRATA, we meet with the highest and most complex development of the generative function. In them, with a doubtful exception in the case of one or two genera of fishes, the sexes are always distinct.

The *osseous* and *cartilaginous* fishes present important differences in their reproductive organs and in their modes of reproduction. In the osseous fishes, the essential female organ—the ovary, or roe—consists of a large membranous bag, usually in two lobes, but sometimes single. When distended with ova, this organ fills the greater part of the abdominal cavity, and its lining membrane is arranged in folds, wherein the ova are formed and retained until sufficiently ripe for expulsion. They then escape into the ovarian cavity, and are expelled in almost incredible numbers through a special opening immediately behind the anus and in front of the urinary canal. As a general rule, the ova of fishes are impregnated after their expulsion; and in order that the impregnation of a sufficient number of eggs may be secured, the male secretion of fishes—the fluid containing the spermatozoa—is very abundant; the male secreting gland, which in fishes is termed 'the milt' or 'soft roe,' being equal in bulk to the ovary of the female. In a few instances, however, the young are hatched in the ovary, and grow to a considerable size before they are born, and in these cases—as, for example, in the viviparous blenny—impregnation must take place internally. In the cartilaginous fishes—as the sharks and rays—the generative organs are of a higher type. The eggs are here always impregnated within the body of the female, the male having special organs by which true sexual congress is effected, and the ovaries form two large racemous bunches, placed on either side of the spine. The eggs are large in size, and comparatively small in number; and as each egg escapes from the ovary, it is seized by a true oviduct, which furnishes it with additional protective coverings. About the middle of this tube 'there is a thick glandular mass, destined to secrete a horny shell, in which the yelk and white of the egg become incased. The egg, when completed, has somewhat the shape of a pillow-case, with the four corners lengthened out into long tendril-like cords, whereby the egg is entangled amongst the seaweed at the bottom of the ocean. A brittle egg-shell would soon be destroyed by the beating of the waves; hence the necessity for the corneous nature of the envelope; and yet how is the feeble embryo to escape from such a tough and leather-like cradle? This has likewise been provided for. The egg remains permanently open at one extremity; the slightest pressure from within, therefore, separates the valvular lips of the opening, and no sooner has the little shark thus extricated itself from its confinement, than the two sides close so accurately, that the fissure is imperceptible.'—R. Jones's *General Outline of the Animal Kingdom*, 1841, p. 534.



Fig. 4.—The Egg of Cartilaginous Fish, opened so as to shew the young animal.

In the *Amphibia* or *Batrachia*, the sexes are more closely associated than in the osseous fishes, the ova being generally impregnated by the male as they escape from the abdominal cavity of the female. The mode of reproduction of one amphibian, the Surinam Toad, is remarkable and anomalous. See PIPA.

In the true *Reptiles*, the male sexual organs become more perfect, instruments being given to facilitate the impregnation of the female during that congress of the sexes which now becomes essential to fecundation.

In *Birds*, the generative organs present a close analogy to those of the higher reptiles. There is only a single ovary (the left) that has a bunch-like or racemous appearance; the right, with its oviduct, being always atrophied or rudimentary—a remarkable violation of symmetry, resembling that which occurs in the lungs of serpents. As prolonged utero-gestation would be incompatible with flight, incubation here attains its highest perfection.

In *Mammals*, a new organ for the first time appears, from which that important class derives its name. In most of them (see MAMMALIA and PLACENTA), a temporary organ, termed the Placenta, is also formed, by which the fœtus is nourished during uterine existence.

For further details on the subject of this article, the reader is referred to De Quatrefages's *Rambles of a Naturalist*, and to his *Metamorphoses of Man and the Lower Animals*; Dr Allen Thomson's article 'Ovum' in the *Cyclopædia of Anatomy and Physiology*; Dr Carpenter's *Comparative Physiology*; and to Kölliker's *Entwickelungsgeschichte des Menschen und der höheren Thiere*.

REPRODUCTION IN PLANTS. See PLANT, VEGETABLE PHYSIOLOGY, and FECUNDATION.

REPTILES (Lat. *repo*, I creep), constitute a class of the subkingdom *Vertebrata*, lying between the classes of Amphibians and Birds. They may be briefly characterised as being cold-blooded, having a heart composed of only three cavities—viz., two auricles and a single ventricle, and as breathing by lungs throughout the whole period of their existence; in which respect they differ from the Amphibians, which some zoologists associate with them, and which, in the early part of their existence, are furnished with gills for aquatic respiration. They are divided into the following orders: 1. *Ophidia*, or Serpents; 2. *Sauria*, or Lizards; 3. *Loricata*, or Crocodiles; and 4. *Chelonia*, or Tortoises; so that in so far as external form is concerned, the members of this class present a far greater diversity than is observed amongst the members of the other classes of vertebrates.

With the exception of the tortoises, the reptiles in general are of an elongated form, the body being often nearly cylindrical, and usually terminating in a very long tail. In a considerable number (as the serpents and some of the lizards) no traces of limbs are apparent; in some (as certain lizards), the limbs are rudimentary; while in the remainder the limbs are fully developed, although not to the extent to which development takes place in birds or quadrupeds, as the feet rarely suffice to keep the belly from the ground. The outer covering of the body presents several well-marked varieties. In a few of the lizards, the skin is covered with regular scales, composed of a mixture of bony and horny matter, and lying over each other like those of fishes; in most

lizards and in serpents, there are scales and plates

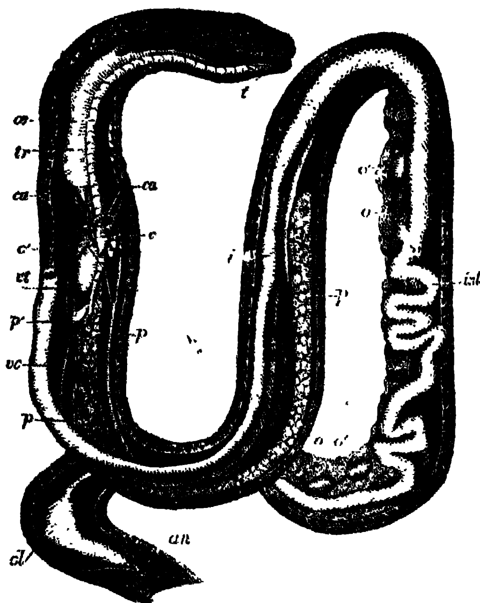


Fig. 1.—Anatomy of a Serpent:
t, tongue and glottis; *œ*, œsophagus (partly removed, to shew heart, &c.); *tr*, trachea; *ca*, *ca*, carotid arteries; *c*, left auricle; *c'*, right auricle; *vt*, ventricle of heart; *vc*, vena cava inferior; *p*, *p*, principal lung; *p'*, rudimentary lung; *i*, stomach; *int*, intestines; *cl*, cloaca; *an*, anus; *o*, ovary; *o'o'*, ova.

developed on the surface of the corium or true skin,

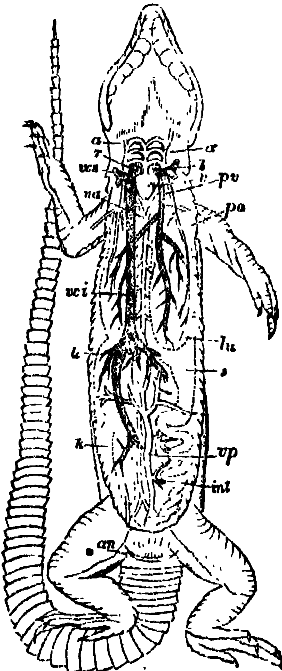


Fig. 2.—Anatomy of Lizard:
a, *a'*, arches of the aorta; *r*, right auricle; *l*, left auricle; *v*, ventricle; *vcs*, vena cava superior; *vci*, vena cava inferior; *va*, ventral aorta; *pv*, pulmonary veins; *pa*, pulmonary arteries; *lu*, lung; *li*, liver and hepatic vein; *k*, kidneys and renal vessels; *vp*, vena portæ; *s*, stomach; *int*, intestines; *an*, anus.

and covered over with epidermis, which is thrown off at intervals, the moult forming an accurate cast of the body of the animal; while in the crocodiles and tortoises the scales are converted into true bony plates, which in the former are embedded in the tissue of the skin, and in the latter are united with the ribs, sternum, &c., of the internal skeleton, to form the complete bony case into which the head and limbs of the animal can be retracted.

The skeleton is completely ossified in all reptiles, and presents many points of interest to the philosophical anatomist, into which we have not space to enter. In the skeleton of the crocodiles and lizards, there is an obvious distinction of the regions of the neck, trunk, and tail. The total number of vertebræ is often great, but it is chiefly in the caudal region that the excess occurs; there being 36 caudal vertebræ in the crocodile, and 115 in the monster lizard. In the serpents, the vertebral column is more abundantly subdivided than in any other animal; the number of vertebræ in the python being 422, of which about six-sevenths possess ribs articulated to their bodies by a ball-and-socket joint. By the motion which is thus allowed to the ribs, they become in some degree instruments of progression. In the reptiles generally (excepting the tortoises), one surface of each centrum (or body) of the vertebræ is concave and the other convex; while in the tortoises these surfaces are flat. The true skull is small, the bulk of the head being made up by the jawbones. As the sutures separating the individual bones never become obliterated, the reptilian skull

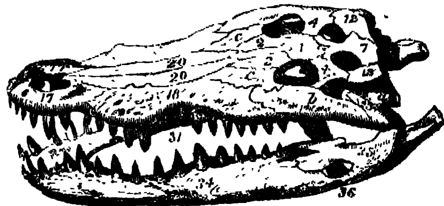


Fig. 3.—Skull of Crocodile.

is well adapted to illustrate the true structure of the vertebral skeleton. In fig. 3, we have the skull of the crocodile; in fig. 4, that of a serpent; and in

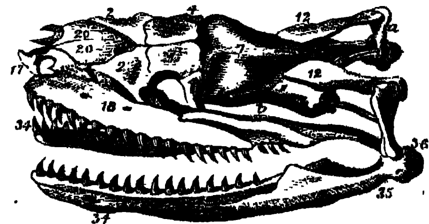


Fig. 4.—Skull of Serpent.

both, the corresponding bones are indicated by the same references. 1 is the *principal frontal*, divided in the serpent into two parts; 2, 2 are the *anterior*, and 4, 4 the *posterior frontals*; 7 is the *parietal bone*, which is usually single in reptiles; 12, 12 are the *mastoid bones* (homologous to the mastoid process in man); 17, 17 are the *intermaxillaries*; 18, 18 are the *maxillaries*; 20, 20 are the *nasals*; 23 is the *temporal bone* (corresponding to the squamous portion of the human bone); 34, 35, 36, 37 are the *dental*, the *articular*, the *angular*, and the *opercular* portions of the *inferior maxilla*, or lower jaw; *a* is the *tympanic bone*, which supports the drum of the ear; *b* is the *zygomatic* or *malar*

bone; and *c*, *c* the *lachrymals*. The lower jaw (except in the tortoises) presents the peculiarity of being composed of a number of separate pieces; there being four or five in each half-jaw in serpents, while in crocodiles and lizards each half is divided into at least five, and generally six pieces, which are united by suture. The four most important of these are shewn in fig. 3. The purpose of this arrangement is probably (as Dr Buckland suggested in his *Bridgewater Treatise*) to diminish the risk of fracture, which would otherwise attend the snapping together of their elongated jaws.

The bones of the extremities, except in the serpents, which have no limbs, correspond with those occurring in the higher vertebrata.

The mouth, except in the Chelonians, is usually provided with conical teeth, adapted rather for seizing and holding prey, than for dividing and masticating food. These teeth, like those of fishes, are successional; that is to say, new teeth are being constantly developed, whilst the older ones are regularly shed. In the crocodiles, three, or even four generations of teeth, sheathed one within the other, may often be seen in the same socket. In some instances, the teeth are attached solely to the jaws, while in others they are also attached to the pterygoid or palate bones. In Chelonians, the teeth are replaced by a horny beak, which, according to the habits of the animal, is adapted for bruising as well as cutting, and which in some species constitutes a somewhat formidable weapon.

The digestive organs present less marked differences than the osseous system. With the exception of certain Chelonians, all reptiles are carnivorous, and swallow their prey whole. Hence the jaws are adapted, by their mobility and subdivision into segments, to open very widely, and the œsophagus is capable of great dilatation. The tongue is commonly free, elongated, and bifid, except in the crocodiles, in which it is immovable; whence the popular idea that these animals do not possess this organ. The stomach is sometimes scarcely larger than the œsophagus and intestines (as in serpents), while in other cases it forms a sac of considerable size. In either case, it is capable of great dilatation. A liver, pancreas, and spleen are always present, the two former glands pouring their secretions into the upper part of the intestine, which is short, wide, and not much twisted, and divided into two portions, corresponding to the small and large intestines of mammals, by a valve. It finally terminates in a wide cloaca, into which the ducts of the urinary and generative organs usually open. The anal aperture of this cloaca is *transverse* in serpents and lizards, and *longitudinal* in crocodiles and tortoises. These peculiarities in the anal aperture are accompanied by remarkable differences in the external generative organs of the male, and seem to divide the class into two great sections.

It is in their circulating and respiratory organs that reptiles present the most marked characteristics. Like birds and mammals, they breathe air, but like fishes, they are cold-blooded. The reason why they are unable to sustain a fixed temperature above and independent of that of the surrounding medium, is due partly to the arrangement of the blood-vessels (see CIRCULATION), and partly to the structure of the lungs. The lungs are usually of large size; but as they are not subdivided, as in mammals and birds, into innumerable microscopic air-cells, the real aërating surface is comparatively small. In several orders, they are merely capacious bags, whose vascular or aërating surface is but slightly increased by sacculi developed in their cells. In serpents, the pulmonary arrangement is singular, one lung (usually the right one) being of extraordinary length, while the other remains altogether rudimentary. It is in the tortoises and crocodiles that the lung is most highly developed; but if the reader will compare the accompanying figure of the lung of the turtle with a section of any mammalian lung, he



Fig. 5.—Section of the Lung of the Turtle (reduced).

will at once perceive the striking difference. This inferiority of the respiratory apparatus of reptiles is further shewn in the absence of those means for the continuous introduction and expulsion of air which are observed in birds, and still more in mammals, and which are described in the article RESPIRATION.

The cerebral portion of the *nervous* system in many respects resembles that of fishes, but the cerebral hemispheres are larger in proportion to the optic lobes, while the cerebellum is usually smaller. The organs of the senses are better developed than in fishes. The eye is always present in reptiles, and presents no remarkable peculiarity. We here first meet with a special arrangement for the protection of this delicate organ; 'for while in serpents the skin of the head passes continuously in front of the eyes, merely becoming transparent where it covers the cornea, it is doubled in most other reptiles into two folds, constituting the upper and lower eyelids, which can be drawn together by a sphincter muscle; and we also find a rudiment of a third eyelid, formed by an additional fold of membrane at the inner angle, which is so completely developed in crocodiles as to form a nictitating membrane, that can be drawn completely across the eye, as in birds, by a muscle specially adapted for that purpose.'—Carpenter's *General and Comparative Physiology*, 3d ed. p. 495. The organ of hearing is more highly developed than in fishes or amphibia. There is no external auditory canal, the membrane

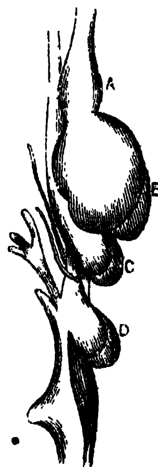


Fig. 6.—Brain of Turtle: A, olfactive ganglia; B, cerebral hemispheres; C, optic ganglia; D, cerebellum.

of the tympanum being covered externally by the integument of the head. The senses of taste and touch are probably obtuse in most animals of this class, and from its structure, the tongue is probably rather an organ of touch than of true taste.

All reptiles are *oviparous* animals. Certain species, however, retain their ova in a sort of uterine cavity, formed by a dilatation of the oviduct near its termination in the cloaca, until the development of the embryo is so far advanced that the enveloping membrane bursts previously to the expulsion of the ovum, so that the young are actually born alive—a mode of generation to which the term *ovo-viviparous* is applied. The eggs are relatively large, and are furnished with a very large yelk, for the nutrition of the young animal. They are enclosed in a parchment-like shell, which contains very little calcareous matter. They are usually deposited in warm sandy places, well exposed to the sun, or in dunghills, in which the heat induced by the putrefactive process facilitates the final stage of embryonic development. Lizards lay from 8 to 12 eggs, serpents from 10 to 50, tortoises from 20 to 26, and crocodiles from 20 to 60. In this respect they differ widely from the amphibia, some of which lay as many as 1200 eggs. The common opinion that, after the expulsion of the eggs, the reptiles take no further care of their progeny, is erroneous. Crocodiles and lizards have been observed to watch the places which they have chosen as their nest; and the pythons (at all events, when in captivity) coil themselves around their eggs, and keep up a temperature very considerably above that of the surrounding medium. The sexes are always separate; and the male generative organs, which are far more highly developed than in amphibians, present peculiarities which, in association with the position of the anal aperture, have been adopted by zoologists as a basis of classification.

In relation to their *habitat*, it may be observed that most of the tortoises and certain serpents are essentially aquatic animals (some inhabiting fresh, and some salt water), which rarely seek the land except for the purpose of laying their eggs. Serpents, however, as a general rule, affect moist places in the neighbourhood of water, although some are inhabitants of dry sandy deserts. Lizards for the most part frequent the sandy districts of hot and tropical regions, and either burrow in the ground or live in holes in trees, walls, &c. Reptiles generally predominate in the warmer regions of the globe, in which alone the largest kinds are to be found. In the northern countries, comparatively few species are found, and these pass a great portion of the year in a state of Hybernation (q. v.) or torpidity. Dr Carpenter puts down 2000 as about the probable number of existing species of reptiles. Schinz states that in Europe there are 7 tortoises, 33 serpents, and 35 lizards. The most complete treatise on the natural history of reptiles is that of M.M. Dumeril and Bibron, in 9 volumes; it is entitled *Erpétologie Générale, ou Hist. Nat. Complète des Reptiles* (Paris, 1834—1854).

REPU'BLIC (Lat. *res publica*, the public good), a political community in which the sovereign power is lodged, not in a hereditary chief, but either in certain privileged members of the community, or in the whole community. According to the constitution of the governing body, a republic may therefore vary from the most exclusive oligarchy to a pure democracy. The several republics of Greece, and that of Rome were, at the outset at least, aristocratic communities. The medieval republics of Venice, Genoa, and the other Italian towns were also more or less aristocratic. The sovereign power was held to be vested in the franchised citizens, and every function—legislative, executive, or judicial—not exercised directly by that body, could only be exercised by parties deriving their authority from it. But the extent of the franchise, and the mode of exercising it, varied much in these civic communities; and the most prosperous and long-lived was Venice, which was also the most aristocratic of them all. In the 16th c., the Seven Provinces of the Netherlands, on their revolt from Spain, adopted a republican form of government, as did Switzerland on becoming independent of the German empire. Great Britain was nominally a republic for eleven years (from 1649 to 1660), and France for the same number of years after her first revolution (viz., from 1793 to 1805). The last French republic lasted only five years (from 1848 to 1853). Switzerland is now, with the exception of the free towns of Frankfurt, Lübeck, Bremen, and Hamburg, and the diminutive San Marino, the only republic in Europe. Since 1848, its constitution has been of a more democratic character than formerly.

The most important of modern republics is that of the United States of America—dating from its separation from Great Britain—where pure democracy has been tried on a scale unknown elsewhere. Mexico was a republic from 1824 until its conquest by the Emperor Napoleon III. in 1864. Nine republics at present exist in South America—Peru, Chili, Paraguay, Bolivia, Colombia or New Granada, Venezuela, Ecuador, Uruguay, and the Argentine Confederation. In the republics of the ancient world, the franchised classes exercised their power directly without any system of delegation or representation. The same was at first the case in the Swiss cantons, where, however, representative government has been gradually introduced. Modern republics have been founded on the representative, not the direct, system, which can hardly exist except in a community that is very small and concentrated as to space. Switzerland and the United States of America are *federal* republics, consisting of a number of separate states bound together by a treaty, so as to present to the external world the appearance of one state with a central government, which has the power of enacting laws and issuing orders which are directly binding on the individual citizens.

REPU'BLICAN, a party name in American politics, which has had at different times different significations. At the adoption of the Federal Constitution in 1787, and while its ratification by the several states was under discussion, the country was divided into two parties—the Federalists, headed by Washington and the elder Adams; and the Anti-federalists (who afterwards took the name of Republicans), under the lead of Jefferson and Madison. The Federalists were in favour of a strong centralised government; the Republicans advocated the sovereignty of the States and the rights of the people; and finally secured those amendments and additions to the Constitution which were intended to guarantee state rights, and which declared that all powers not expressly granted to Congress by the Constitution, are retained by the States or the people. During the French Revolution and the wars which succeeded it, the Federal party sympathised with England, while the Republicans favoured the French; and being in power, under the presidency of Mr Madison, declared war against England in 1812, a measure which the Federalists violently opposed, going so far in the Hartford Convention as to threaten a dissolution of the union. During the political excitements of this period, when the excesses of the French revolution had

thrown a certain degree of odium upon its supporters, the Republicans were stigmatised by their opponents as Democrats. The name, given as a reproach, was soon adopted; and the party of Jefferson and Jackson called itself Democratic Republican, and its members were usually called Democrats; while the name of Federalist having become unpopular by the opposition of the party to the war with England, it adopted the designation of National Republicans, and some years later, of Whigs, which was the name taken by the 'disloyal' party in the War of Independence, the 'loyal' party being called Tories. The Whigs of 1840 repudiated alike the principles and name of the Federalists; they professed to be followers of Jefferson, and called themselves Democratic Whigs.

In the effort to elect Mr Fremont in 1856, and in the election of Mr Lincoln in 1860, the Whig party, deserted by many of its more conservative members, known as Old Whigs, but reinforced by a larger number of Free-soil Democrats and Abolitionists, adopted the name of Republicans, and were called by their opponents Black Republicans, from their anti-slavery tendencies. In the presidential contest of 1864, the Republicans, hoping to secure the support of the War or Union Democrats, have taken the name of the 'Union Party,' while they go further than the ancient Federalists in support of a strong centralised government. The Federalist, National Republican, Whig, and Republican party has been essentially the same, and for the most part a New England or Northern party—its principal leaders having been John Adams, Josiah Quincy, Alexander Hamilton, Daniel Webster, Henry Clay, Wm. H. Seward, and Abraham Lincoln. The Democratic party had its centres in Virginia and New York, and was the party of Jefferson, Madison, Jackson, Calhoun, Van Buren, Polk, Pierce, Buchanan. The former party advocated a construction of the Constitution favourable to the powers of the Federal government, a national bank, and a high protective tariff; the Democratic party, on the other hand, held to a strict construction of the Constitution, a careful limitation of the powers of the central government, an independent treasury, a specie currency, and free-trade, or a tariff for revenue only. There was, 20 years ago, a respectable Whig minority in most of the Southern States, and in two or three, Whig majorities; but when the Whig party adopted abolition, and took the name Republican, every southern state voted with the Democratic party.—Other party names met with in American political writings are of a local, factional, or temporary character. 'Blue-light Federalist' was a name given to those who were believed to have made friendly signals to British ships in the war of 1812. 'Clintonians' and 'Bucktails' were old factions of the Democratic party in New York. 'Barnburner' was applied as a term of reproach to a section of the democracy supposed to be in sympathy with the 'Anti-renters.' The 'Soft Shells' were 'Free-soil' Democrats, in favour of excluding slavery from the territories and future states of the Union; while the 'Hard Shells' were in favour of what they held to be the rights of the South. The more widely known name of 'Locofoco,' applied to, and good-naturedly accepted by the Democratic party, arose from the fact, that a meeting of a section of the party in Tammany Hall, its New York headquarters, having been deprived of light by the turning off of the gas, at the order of the party managers, lighted up the hall with candles, by the aid of lucifer or loco-foco matches, and so passed its resolutions. 'Copperhead,' the name of a venomous serpent, is applied to the peace party by the advocates of the war for the Union.

REPULSION, like Caloric, Luminous Corpuscles, and other crude hypotheses of medieval times appears to be doomed to speedy extinction. The apparent repulsion between the particles of a gas, in virtue of which it exerts pressure on the containing vessel, is now known to be due to motion (see HEAT). A wet cork and an oiled one, floating on water, repel each other—a phenomenon fully accounted for by capillary *attraction;* as is that of the apparent repulsion of mercury by glass, which is shewn to be due to the fact, that mercury attracts itself more than it attracts glass. No one now believes that a balloon rises while a stone falls, because the former is repelled, and the latter attracted, by the earth. The last is a very good example, because it clearly shews how apparent repulsion may be the result of attraction. The earth attracts the balloon *less* than it attracts an equal bulk of the medium (air) in which it floats; and, consequently, the pressure of the air on the balloon is more than sufficient to support its weight. The moon raises tides not only on the side of the earth nearest her, but also on that furthest from her. No one imagines that she attracts the nearer water, and repels the further. We know that she attracts the nearer water more, and the further less, than she attracts the earth; and that the apparent repulsion is thus merely a difference of attractions.

It is not quite so clear how we are to account generally for repulsion in Electricity (q. v.), Magnetism (q. v.), and Electro-magnetism (q. v.), though many of these phenomena are known (especially by the beautiful experimental researches of Faraday) to bear explanations precisely analogous to that of the balloon above alluded to. There are also very curious problems, apparently involving repulsion, connected with the behaviour of the tails of comets. But it is reasonable to suppose that, in all probability, we shall soon be able to account for all these phenomena by simple differences of attraction on the body influenced and the medium which surrounds it. Our real difficulty will thus be reduced to the explanation of attraction itself, which promises to be a problem of a far higher order of complexity. For an account of some of the modern speculations on this subject, see FORCE.

REPUTE, in Scotch Law, is used sometimes as a technical term, which it is not in English law. Thus, a habit and repute thief is one who, as a matter of fact, is notoriously a thief. So habit and repute marriage is a marriage constituted between parties who have notoriously lived as man and wife, and are supposed by neighbours and friends to be married, though there never was a regular marriage.

REPUTED OWNERSHIP is a phrase used in the English Bankruptcy Law to denote that the bankrupt at the time of his bankruptcy was apparently the owner of goods in his possession. The general rule is, that whatever belonged to the bankrupt at that date goes to his assignees in bankruptcy, for the purposes of sale, and distribution of the proceeds among his creditors. But as a trader often has the goods of others in his possession with their consent, and thus has the appearance of a greater capital or stock than he possesses, and thereby obtains greater credit than he would otherwise do, it is provided by the Bankrupt Act that if the bankrupt at the date of his bankruptcy shall, with the consent of the true owner, have in his possession, order, or disposition any goods or chattels whereof he was the reputed owner, or whereof he had taken upon him the sale, alteration, or disposition as owner, the Bankruptcy Court shall have power to order the same to be sold and disposed of for the benefit of the creditors under the

bankruptcy. The object of this is to prevent deceit by a trader from the apparent possession of property to which he is not entitled; as it makes the real owners of goods who intrust them to a trader, careful, that they run the risk of the goods being seized for the general benefit of the creditors. Where, however, the articles in possession of the bankrupt are of that peculiar description that they are naturally calculated to excite an inquiry on the part of creditors as to whose they are, it is otherwise. Thus, pictures deposited with a bankrupt to take charge of, as they do not lead to any erroneous belief on the part of persons dealing with him, so they do not fall to be sold and divided as part of his assets. A similar doctrine exists in Scotland by the common law, and is therefore applied to other cases than bankruptcy. By the Mercantile Amendment Act, 19 and 20 Vict. c. 60, s. 1, in order to assimilate the law to that of England, it was declared that goods sold, but not delivered, shall not be attachable by the creditors of the seller, to the effect of preventing the purchaser or others from enforcing delivery of the same, and the right of the purchaser to demand delivery of such goods from and after the date of the sale, shall be attachable by the creditors of the purchaser.

REQUE'ÑA, a town of Spain, in the modern province of Cuença, and about 80 miles south-east of the town of that name. It contains an industrious population, amounting to 10,500, who are employed in the manufacture of woollen, cotton, and silk fabrics.

REQUE'STS, Court of, an ancient court of equity in England, inferior to the Court of Chancery, and presided over by the Lord Privy Seal. It was abolished by 16 and 17 Char. I. c. 10. Also, a local tribunal (known likewise by the name of Court of Conscience) instituted in London by Henry VIII. for the recovery of small debts, with jurisdiction between citizens and freemen in questions of debt or damage under 40s., afterwards extended to questions under £5. Similar local tribunals were instituted by act of parliament in other parts of the kingdom; but they have all been superseded by the county courts.

RE'QUIEM (Lat. *requies*, rest), a dirge or solemn service for the dead in the Roman Catholic Church. It consists in the celebration of the mass *Pro Fidelibus Defunctis* (For the Faithful Departed), the first words of the Introit of which are *Requiem æternam*.

RE'REDOS (Fr., behind the back), the wall at the back of an altar, seat, large fireplace, &c. In churches, the reredos is usually in the form of a screen detached from the east wall, and is invariably ornamented with niches, statues, &c., or with paintings or tapestry. Very fine examples exist at Durham, St Albans, &c.

RE'SCRIPTS (Lat. *rescripta*), answers of the popes and emperors to questions in jurisprudence officially propounded to them. *Rescripta principis* were one of the authoritative sources of the civil law, and consisted of the answers of the emperor to those who consulted him, either as public functionaries or as individuals, on questions of law. They were often applied for by private persons, more especially women and soldiers, to solve their doubts or grant them privileges. The rescripts directed to corporate and municipal bodies were known as *Pragmaticæ sanctiones*, a name which has found its way into the public law of Europe. See Pragmatic Sanction. Rescripts might gradually come to have the force of law, in so far as their determinations in particular cases were of general application.

RE'SCUE, in English Law, is the illegal delivery and discharge of a prisoner or of goods out of the custody of the law. If, for example, a tenant whose goods are distrained for rent, take them by force from the bailiff, the distrainer has a right of action against the tenant or person who rescues the goods. When a prisoner is in custody for felony, and is rescued, the rescuer commits a felony. So the rescue of a prisoner for debt is an indictable offence, punishable by imprisonment for life, and forfeiture of lands and goods.

RESE'CTION or **EXCISION OF JOINTS** is an operation in which the diseased bone of a joint is cut out, in place of cutting off the whole limb. Dr Druitt, in his able summary on this subject in *The Surgeon's Vade-mecum*, remarks, that 'it seems to be established that excision is on the whole safer than amputation; less violence is done to the body, fewer great arteries and nerves are injured, and, what is of more consequence, fewer large veins are divided, and as the articular end of the bone only is sawn off, and the medullary canal not touched, there is less chance of pyæmia. Lastly, the patient is left with an imperfect limb, it is true, but with one which, in most cases, is highly useful.' The operation has been performed on the ankle-joint, the elbow, hip-joint, knee, and shoulder. Few subjects have in recent times excited more discussion among surgeons than the application of this operation to the knee-joint. The operation was first performed in 1762; and up to the year 1830, there are records of 19 cases, out of which 11 died. From 1830 to 1850, the operation was never performed, and was generally condemned; but in the last-named year it was revived by Professor Fergusson, and is now a frequent and regularly-recognised operation. 'The cases,' says Dr Druitt, 'in which it ought to be performed are, generally speaking, such cases of injury or disease as would otherwise be submitted to amputation. The *object* of the operation is to produce a firm and useful limb, slightly shortened, and with entire bony union or fibrous union, admitting of some small degree of motion at the situation of the joint. But all cases are not suitable for excision; and those cases are unsuitable and better adapted for amputation in which either the *quantity* of the diseased bone is very great (for then the case will probably not do well, or, if it proceed to recovery, and the patient be young, the future growth of the limb will be prevented), or the *quality* of the disease may be such as experience has shewn to be incompatible with the exudation of healthy material of repair.' In at least 50 per cent., the operation results in a good useful leg. It has already saved so many limbs that it must be regarded as one of the greatest triumphs of modern surgery.—Further information on this subject may be found in Professor Fergusson's *Lectures on Conservative Surgery*, delivered in 1864 at the Royal College of Surgeons, and reports in *The Lancet*.

RESEDA'CEÆ, a natural order of exogenous plants, mostly herbaceous; having alternate leaves; terminal spikes of hermaphrodite irregular flowers; the calyx of 4—7 unequal segments; the corolla of 4—7 petals, alternate with the segments of the calyx, the lower petals entire, the upper much cut; the stamens 10—30, inserted on a fleshy receptacle; the germen free, one-celled; the fruit a many-seeded capsule, three-horned, and often open at the apex, so as to expose the seeds, which are kidney-shaped. There are about forty known species, mostly natives of Europe and the west of Asia, and mostly mere weeds. Weld (q. v.) and Mignonette (q. v.) are the species most worthy of notice.

RESERVATION is a term used in lease and also in grants of a less estate than the fee-simple. Thus, if A, the owner in fee-simple of real estate, grant a lease to B, a third party, he does not give away his whole interest, but merely part of it, and that part not given away is said to be reserved or excepted. The word reservation is, however, chiefly used in reference to rent, it being said that a landlord, on letting his land, reserves to himself a rent out of the premises, and he has certain well-known remedies for the recovery of such Rent (q. v.).

RESERVATION, MENTAL (Lat. *reservatio* or *restrictio mentalis*), the act of reserving or holding back some word or clause which is necessary to convey fully the meaning really intended by the speaker. It differs from equivocation (Lat. *equivocatio* or *amphibolia*) in this, that in the latter the words employed, although doubtful, and perhaps not fitted naturally to convey the real meaning of the speaker, are yet, absolutely speaking, and without the addition of any further word or clause, susceptible of that meaning. Thus, an example of an equivocation would be: 'I did not write this libel,' meaning, 'I did not perform the mechanical operation of *writing it with a pen*,' although I had really *composed* and issued it. A mental reservation might be involved in the same words, if one were to say: 'I did not write this libel,' mentally withholding the word 'to-day,' although he had written it 'yesterday,' or on some earlier day. Few questions in casuistry have excited more controversy, or have been the subject of fiercer recrimination, than that of the lawfulness of equivocation and mental reservation. In the celebrated *Letters* of Pascal (q. v.) against the Jesuits, it was one of the most prominent, and used as he employed it, the most effective topics; and Pascal's charges against the Jesuit casuistry of that day have been repeated in almost every popular controversy on the subject which has since arisen. There are several varieties of mental reservation, differing from each other, and all differing from equivocation under its several forms. But as regards the morality of the subject, all the forms of language calculated to deceive may be classed together, and may be treated according to the same common principles. Mental reservation is of two kinds, *purely mental* and *not purely mental*. By the former designation is meant a mental reservation which cannot be detected, whether in the words themselves, or in the circumstances in which they are spoken. Of this kind, would be the mental reservation implied if a person, on being asked if he had seen A. B. (whom he really had just seen *walking* by), were to reply: 'I have not seen him,' meaning '*riding on horseback*.' A 'not purely mental' reservation is that which, although not naturally implied or contained in the words, may nevertheless be inferred or suspected, either from them or the circumstances in which they are used. Of this kind would be the mental reservation of a servant, in giving the ordinary answer to a visitor's inquiry for his master: 'Not at home,' although his master were really in the house; or that of a confessor, who, in a country where the privileges of the secret of the confessional are known and admitted, on being asked whether a certain person had committed a crime, which the confessor knew from his confession that he had committed, should answer: 'I do not know,' meaning 'outside of the confessional.' And, in general, all such doubtful forms, whether of mental reservation or of equivocation, may be divided into *discoverable* and *undiscoverable*. Much, although certainly not all the odium which has been excited against the casuists for their teaching on this head, has arisen from the confusion of their views as to these two classes of mental reservation; and the witty ingenuity with which Pascal mixed up examples of both, and applied to one what was really said of the other, did far more to damage the theological reputation of his adversaries, as a school, than any of the genuine really objectionable decisions which he cited from the writings of individual divines. Mental reservation has formed a subject of discussion for Protestant as well as Catholic divines; but without entering into a detailed history of this curious branch of casuistry, we shall content ourselves with stating briefly the chief principles on which the decisions of the most approved writers, especially of the Roman Catholic School, are founded.

First, 'purely mental' reservations, and 'absolutely undiscoverable' equivocations, are held to be in all cases unlawful, such forms of speech being in truth lies; inasmuch as they have but one real sense, which is not the sense intended by the person who uses them, and hence can only serve to deceive. This doctrine is held by all sound Catholic casuists, and the contradictory doctrine is expressly condemned by Pope Innocent XI. (Propp. 26, 27). On the contrary, mental reservations 'not purely mental,' and 'discoverable' equivocations, are held to be not inconsistent with truth, and, in certain circumstances, when there is necessity or weighty reason for resorting to them, allowable. For the absolute admissibility of the expedient of mental reservation and of equivocation in such circumstances, casuists allege scriptural precedent from Genesis xx. 12, Matt. xi. 14, Acts xxiii. 6, and other passages; and the principles on which their use, in such case, is defended, are (1). that there is supposed to be in the circumstances justification, and even necessity, for not making known the whole truth; and (2) that the mental reservation in the case supposed does not amount to more than a mere *withholding the entire truth*, inasmuch as what is stated is absolutely true, and the real meaning of the speaker is absolutely *contained in it, and discoverable from it;* and the false construction put upon it by the hearer, although permitted through necessity or grave reason by the speaker, is not *positively* put forward by him. A historical example of such equivocation or reservation is in the well-known answer of St Athanasius to the question of the party who were in pursuit of him, and who, overtaking him, but not knowing his person, asked what way Athanasius had gone. '*He is not far off*,' replied Athanasius, and the party passed on in pursuit. A less easily discoverable equivocation is ascribed to St Francis of Assisi, who, when a gang of robbers in pursuit of a traveller asked him whether he had seen the traveller pass by, put his hand up the sleeve of his habit, and replied: 'He did not pass *this* way,' meaning, 'up his sleeve.' And an ordinary example of discoverable mental reservation is that of a person who, on being asked by one to whom he could not with safety give a refusal, whether he has any money, should reply: 'No,' meaning, 'none to lend to you.' In order, however, to justify the use of these devices of speech, casuists require that there shall be some grave and urgent reason on the speaker's part; as, for example, the necessity of keeping a state secret, or a secret of the confessional, or of a professional character, or even the confidence intrusted by a friend, or the ordinary and fitting privacy which is required for the comfort and security of domestic life, and of the peaceful intercourse of society; and that the concealed sense of the form of speech employed, although it may be *actually undiscovered*, and even unlikely to be discovered, may yet be, in all the circumstances, *really discoverable*. On these two leading theoretical principles, the majority of

casuists are agreed. But a wide field for practical discussion lies between them, in the variety of senses which may be attached to the phrases 'not purely mental' and 'discoverable;' and it is in the practical interpretation of these terms that some of the casuists have found scope for the introduction of the lax decisions which have brought odium upon casuistry. Much of this odium has fallen upon the Society of the Jesuits, to such a degree, that their name has been popularly associated with the worst forms of the practice of mental reservation. See JESUITS and PASCAL.—See Scavini, *Theologia Moralis*, ii. 23; Murray, *Theological Essays*, iv. 274, and foll.

RESERVA'TUM ECCLESIA'STICUM, a provision of the religious Peace of Westphalia, so very celebrated in German history, that a brief explanation seems necessary. By this clause of the Treaty of Westphalia (1549), it was enacted, that if the holder of any ecclesiastical dignity, or of any territorial jurisdiction or property annexed to such ecclesiastical dignity, should change his religion, the dignity, territorial jurisdiction, or property held by him, should not be thereby alienated from the church from which he seceded, but should be still 'reserved' for that church, and for the legitimate successors of the seceder. It was chiefly out of the disputes regarding the violations of the R. E., that the Thirty Years' War arose.

RESE'RVE, in Army affairs, has several meanings. First, in a battle, the reserve is a body of troops held somewhere in the rear, generally out of fire, and kept fresh, in order that they may interfere with decisive force at any point where yielding troops require support, or an advantage gained needs powerful following up. The *reserve* of ammunition is a magazine of warlike stores, situated between an army and its base of operations, sufficiently retired from the front to be safe from sudden raids of the enemy, and at the same time advanced enough to allow of the supply actually in the field being speedily replenished.

The reserve of a nation is that force upon which the national defence is thrown, when its regular armies have failed in securing its safety. This reserve may be the *levée en masse* of the whole adult male population, or it may consist of a smaller section of the people duly trained to arms. The latter is, of course, the preferable system, when the arms of scientific modern warfare are to be brought into action. In different countries, the reserves are organised on very different principles. In Great Britain, they comprise the army of reserve, the enrolled pensioners, both of which consist of old soldiers, the militia, yeomanry, volunteers, and trained constabulary. According to the latest returns, the strength of this reserve (omitting the constabulary) was as follows, all being trained men, and instantly available on emergency:

	Great Britain.	Ireland.	Total.
Army of Reserve (veterans),	982	182	1,164
Enrolled Pensioners (veterans),	8,516	4,812	13,328
Militia—Artillery and Infantry,	75,283	27,184	} 109,986
" (Channel Islands),	7,519		
Yeomanry Cavalry, . .	14,268		14,268
Volunteers, . . .	165,413		165,413
Total, . .	271,981	32,178	304,159

The army of reserve and enrolled pensioners could be forthwith raised to 35,000, or even 40,000 men, all fit for any sort of garrison-duty. The militia could be augmented to 140,000, the quotas from Scotland and Ireland being 30,000 below the maximum fixed by parliament. The militia, yeomanry, and volunteers are capable of taking the field in conjunction with regular troops.

The reserve of the British possessions abroad amounts nominally to 90,780 men, but the actually qualified combatants are probably far less numerous.

The reserve forces of the principal states of the world are variously composed, as in France, the national guard; in Prussia and other German states, the Landwehr, with, as a last resort, Landsturm, which amounts to a *levée en masse* of the population able to bear arms.

The *Army of Reserve* is a force incorporated under the act 22 and 23 Vict. c. 42 (1859), and composed of men who have served at least five years in the army. The object in its creation was to retain for the defence of the country those men who, having enlisted for short service, have been drilled in the army, but have quitted it without having earned a pension. As more men of this class are discharged, the army of reserve may be expected to increase; but at present it is considered to have been rather a failure, only 1164 men being enrolled out of the 15,000 contemplated. Each man receives £4 annually as a retaining fee, besides infantry-pay while training, the period for which is limited to 12 days in each year. The men are allowed to complete by service in the army of reserve (two years reckoning as one in the regular army), the service necessary to qualify them for pensions. During training, the men are attached to infantry regiments, or dépôts, or to the force of enrolled pensioners; in war, or tumult, they may be embodied for any time during which their services are required. Enrolment in the army of reserve must take place within five years from discharge from the army.

RESE'RVED LIST, in the Royal Navy, is a device for expediting the promotion of officers who are still of an age for active service. Under certain Orders in Council of 1851 and 1853, old officers of good service are selected for promotion to the next grade on the Reserved List. This forms a bar to any further promotion; and removes the officer from active employment, except in the remote contingency of the Active List being exhausted, when these 'reserved' officers would be liable to be called upon to serve. For all practical purposes, however, the Reserved List is a retired list. The officers placed on it obtain the half-pay of the rank to which they are promoted, and their removal gives vacancies for the promotion of younger and more efficient men. In 1864, there were on the Reserved List 113 flag-officers, 92 captains, 99 commanders, 278 lieutenants, 92 masters, 2 paymasters, and 1 secretary; in all, 677 officers, costing annually £132,760 for their half-pay.

RE'SERVOIR, a receptacle for storing water for any purpose, but chiefly for the supply of towns, for driving machinery, feeding canals, irrigation, or for some process of manufactures. Generally, every water-works' establishment, for the supply of a town, requires to construct one or more reservoirs for providing compensation to the mills situated on the stream, for the water that is abstracted from any of its feeders.

The most advantageous position for a store reservoir is that where there is a narrow gorge in a valley widening out upwards into a flat expanse, thereby enabling a comparatively small dam or embankment formed in the gorge, to impound a large body of water; but in many cases where there is no such choice, the embankment may require to be placed across a wide part of a valley which narrows as it ascends, thereby requiring a great embankment, in proportion to the quantity of water impounded. Sometimes reservoirs have

to be formed on flattish ground affording no great natural facilities for storing water; and in such cases they may require to be embanked wholly or nearly round and round. Where a reservoir requires to be constructed on perfectly level ground, the excavation must be calculated to be exactly equal to the embanking. The worst possible situation for a store reservoir is on the slope of a hill.

In many cases, natural lakes are used as reservoirs, means being adopted for raising or lowering the surface of the water, the difference between the lowest and the highest level of the lake's surface, multiplied by its area, being the measure of the available storage. Instances of this occur in Loch Leven, Kinross-shire, for the supply of the mills on the river Leven; in Loch Katrine and Loch Vennachar, for the supply of the city of Glasgow, and for the compensation required by the millers on the river Teith, in consequence of the abstraction of the Loch Katrine water; and in many other similar cases both for the use of towns and for water-power.

The capacity of a reservoir necessary for making nearly the whole water of a district available for use, depends much on the climate. Where droughts are of long continuance, its capacity requires to be proportionally large, but generally in Great Britain a capacity of six or seven months' supply is reckoned sufficient.

As illustrative of the very different facilities afforded by different sites for storing water, an instance occurs of two reservoirs of the Edinburgh Water Company, whereof one with an

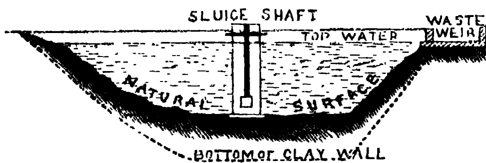


Fig. 1.—Elevation of Reservoir.

embankment containing 175,000 cubic yards of earthwork impounds only 17 millions of cubic feet of water; while another, with an embankment of 53,000 cubic yards, impounds 85 millions of cubic feet, there being a single embankment across a valley in both cases. Generally, the structure for

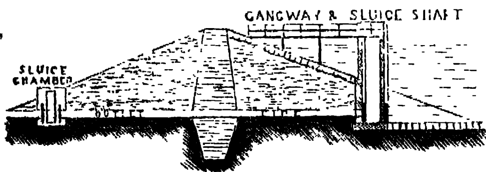


Fig. 2.—Transverse Section of Reservoir.

impounding water is an earthwork embankment, with a slope towards the water of 3 or 4 horizontal to 1 perpendicular, a breadth across the top of from 6 to 12 feet, the height being from 4 to 7 feet above the water, and an outside slope of from 2 to 2½ horizontal to 1 perpendicular. The earthwork ought to be formed in thin layers well rammed, and to have a puddle-wall of good well-worked clay in the centre, the foundation of the puddle being a trench dug down to impervious rock or clay. The face towards the water requires to be protected by stones; and when a reservoir is large, those stones must be 'pitched'—i. e., regularly set by hand—so as to be able to resist the lash of the waves. In all cases, there is imperatively required a waste-weir, to allow flood-waters to escape without risk of overflowing the dam. It ought, if possible, to be placed on the solid ground; and if it can be cut through solid rock, that is best, and saves a great expense for masonry. The width of the waste-weir must be regulated by the catchment or extent of gathering-ground of the reservoir, and by the rainfall of the district; but for a given catchment and rainfall, a reservoir having a small area ought to have a larger waste-weir than one having a larger area, as the latter would allow flood-water to accumulate without rising to so high a level as it would in the former. Generally, however, from 12 to 20 feet of length of waste-weir may suffice for a square mile of catchment. In some cases, dams across gorges, for the purpose of forming reservoirs, are constructed of walls of heavy masonry, instead of earthwork embankments. Those across rivers for diverting the water into mill-lades, and for retaining the water which would otherwise be wasted at meal-hours, are generally constructed of stone, but sometimes of timber or iron.

The word dam is very often used incorrectly in Scotland to indicate a reservoir or sheet of water, instead of the structure made use of to form the reservoir, which is its proper meaning. A reservoir requires a sufficient outlet at the bottom by means of a tunnel, culvert, or iron pipes provided with suitable sluices, and these ought properly to be so arranged as that access can be had to them even when the reservoir is full.

Most of the disasters from the bursting of reservoirs have arisen from the want of sufficient waste-weirs, and from the embankments being overtopped in consequence by the water, and the outer slope being washed away, so as to deprive the puddle-wall of its support; but some accidents have occurred from the outlet being by a wooden box or trough through the embankment, and that being neglected and allowed to get rotten. The bursting of the Bilberry Reservoir, above Holmfirth, which occurred in 1852, arose from the embankment having sunk to, and being allowed to remain at, a level actually below that of the waste-weir, so that it was overtopped; but the Bradfield Reservoir embankment of the Sheffield Water-works which burst in 1864, gave way before the water had risen to the level of the waste-weir; and much difference of opinion exists as to the cause; some engineers contending that the disaster was caused by bad workmanship in the embankment itself, and others that it was owing to a landslip under the embankment.

Distributing reservoirs for towns, used chiefly for storing up the surplus water during the night, which otherwise might mostly go to waste, ought to hold at least half a day's supply, and ought to be placed high enough to command the highest parts of the town. They are generally built of masonry or brickwork, but are sometimes made of cast iron, and now occasionally of boiler-plate—in which last case they are best of circular form. There is one of that description on the highest part of Edinburgh Castle. In India and in the south of Europe, where long droughts prevail, very large reservoirs have been constructed for supplying water for the purpose of irrigation.

RESHD, one of the most industrious and extensively commercial towns in Persia, capital of the maritime province of Ghilan, stands on the Bay of Enzelli, a lagoon on the south-west shore of the Caspian Sea, 150 miles north-west of Teheran. It is in great part covered with trees, so that no accurate idea of its extent can be obtained by viewing it from any one point. The houses are all tiled and are neatly built, and the streets paved; water is supplied

by an aqueduct, and there are a palace, vast, gloomy, and ruinous; numerous caravanseras, large bazaars, and about 1200 shops and warehouses. Indian wares are imported from Balfrush, in Mazanderan, and European manufactures from Russian Armenia. Extensive manufactures of deservedly celebrated embroideries are carried on. Pop. 15,000. Enzelli, the port of R., on the Caspian Sea, is about 18 miles distant, and has 2500 inhabitants.—Eastwick's *Diplomate's Residence in Persia* (London, 1864).

RESI'DUARY LEGACY is a legacy of all that remains after the debts and legacies have been paid out of the estate of a deceased person. Debts must always be paid before legacies, and the next thing to be done is to pay all the express legacies; and as these seldom absorb the whole of the free assets, the residuary legacy is more or less valuable according as the express legacies are smaller than the free assets. If the express legacies swallow up all the funds, the residuary legacy is worth nothing.

RESI'NA, a town of Southern Italy, in the province of Naples, situated at the foot of Vesuvius, and facing the sea. Pop. 13,320. R. is built above the site of the ancient Herculaneum. Exquisite fruits are grown, and valuable wines made in the vicinity. It is surrounded by country-houses, and is a place of recreation for the Neapolitans, on account of its salubrity. The ascent of Mount Vesuvius is begun at Resina.

RE'SINS, a class of natural vegetable products composed of carbon, hydrogen, and oxygen. They are closely allied to the essential oils, all of which, when exposed to the air, absorb oxygen, and finally become converted into substances having the characters of resin; and in most cases, they are obtained from the plants which yield them, mixed with and dissolved in a corresponding essential oil. Like the natural oils, the natural resins are usually mixtures of two or more distinct resins, which admit of separation by their unequal solubility in different fluids.

The following are the general characters of this class of compounds. At ordinary temperatures, they are solid, translucent, and for the most part coloured, although some are colourless and transparent. Some are devoid of odour, while others give off an aromatic fragrance from the admixture of an essential oil. In their crude state, they never crystallise, but are amorphous and brittle, breaking with a conchoidal fracture; when pure, several of them may, however, be obtained in the crystalline form. They are readily melted by the action of heat, and are inflammable, burning with a white smoky flame. They are usually described as non-volatile, but it has been recently shewn that common resin may be distilled in a current of superheated steam. They are insoluble in water, but dissolve in alcohol, ether, and the essential and fixed oils. They are insulators or non-conductors of electricity, and become negatively electric by friction. Many of them possess acid properties, in which case their alcoholic solutions redden litmus. These resins combine with the alkalies, and form frothy soap-like solutions in alkaline lyes. The resinous soaps thus formed differ from ordinary soap in not being precipitated by chloride of sodium.

The resins are divisible into the *hard resins*, the *soft resins*, and the *gum resins*.—The hard resins are at ordinary temperatures solid and brittle; they are easily pulverised, and contain little or no essential oil. Under this head are included copal, the varieties of lac, mastic, and sandarach, and the resins of benzoin (commonly called gum-benzoin), jalap, guaiacum, &c.—The soft resins admit of being moulded by the hand, and some of them are viscous and semi-fluid, in which case they are termed *balsams*. They consist essentially of solutions of hard resins in essential oils, or admixtures of the two. They become oxidised and hardened by exposure to the air into the first class of resins. Under this head are placed turpentine, storax, balsam of copaiva, and the balsams of Canada, Peru, and Tolu.

The gum resins are the milky juices of certain plants solidified by exposure to the air. They consist of a mixture of resins and essential oils with a considerable proportion of gum; and on this account, when rubbed up with water, they yield a turbid or milky fluid from the dissolved gum, retaining the resin and oil in suspension, and are only partly soluble in alcohol. Some of them, as ammoniacum, asafœtida, euphorbium, galbanum, gamboge, myrrh, olibanum, &c., are valuable medicinal agents; while others, as caoutchouc (or india-rubber) and gutta percha, are of great value in the arts and in manufactures.

The resins are very widely diffused throughout the vegetable kingdom. But there are certain families of plants which are especially rich in them. They are generally obtained by making incisions into the wood of the trees which produce them; sometimes, however, they exude spontaneously, and in other cases require to be extracted from the wood by boiling alcohol. The crude resins are separated from the essential oils with which they are usually mixed, by distillation with water, the resin remaining while the oil and water pass off; and from the gummy and mucilaginous matters, by alcohol, which dissolves out the pure resins, which can be precipitated from their alcoholic solution by the addition of water.

The resins are extensively employed in medicine; and in addition to the almost innumerable applications of caoutchouc and gutta percha, various resins are of service in the preparation of varnishes, soaps, pigments, artificial light (resin-gas), &c.

Various fossil resins are known, of which the most important is amber. Some chemists place bitumen and asphalt amongst this class; and amongst the fossil resins described by mineralogists may be mentioned Fichtelite, Hartite, Idrialite, Ozokerite, Scheererite, Xyloretin, &c.

The common resin, or rosin, of commerce exudes in a semi-fluid state from several species of pine, especially *Pinus tæda*, *P. mitis*, *P. palustris*, and *P. rigida* of North America, *P. pinaster*, *P. pinea*, and *P. Laricio* of Southern Europe, and *P. sylvestris* of Northern Europe. The process of collecting it is

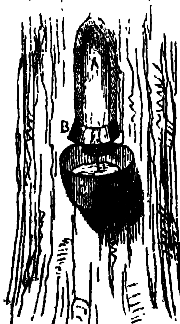


Fig. 1.



Fig. 2.

very simple: a longitudinal slice of the bark and wood (see fig. 1); about a foot in length, is taken off

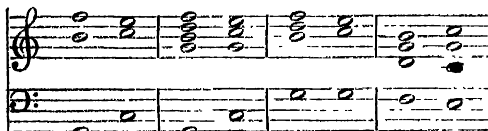
by means of an axe with a curved blade (fig. 8); and at the bottom of the groove thus made, a small piece of bent wood or thin metal, as tin or zinc, is driven into a curved cut, made by one blow of the axe (B, fig. 1): this forms a sort of spout, which catches the liquid resin as it runs from the wound, and guides it into a small pot, made of common clay burned. At certain periods, these pots are emptied, and their contents put into casks, for transport to the distilleries, where the volatile essential oil is removed from the resin. The resin thus procured is used very extensively in the manufacture of common yellow soap, also for sizing paper and various other purposes, including the preparation of ointments and plasters in pharmacy.

The other resins most generally known and used in Europe are Anime (q. v.), Copal (q. v.), Dammar (q. v.), Mastic (q. v.), Sandarach (q. v.), Frankincense (q. v.), Lac (q. v.). In addition to these, there are many which are of essential service in other countries, as the Piny Resin or Dhoop, obtained from *Vateria indica;* Black Dammar, obtained from *Canarium strictum;* Saul Resin, or Dammar Batu, from *Shorea robusta*—all of which serve many useful purposes in India, China, Japan, and other Asiatic countries. The forests of South America furnish many others.

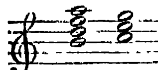
RESI'STING A CONSTABLE is an offence punishable by justices of the peace in a summary manner.

RES JUDICA'TA, in Law, means that the subject-matter of an action has been already decided by a court of competent jurisdiction, and if so, a plea setting up the *res judicata* is a sufficient defence. In order to be binding, however, the suit in the former case must have been between the same parties.

RESOLU'TION, in Music. In the progression of chords in a musical composition, there are certain chords that require to be followed by certain others, or, as it is called, *resolved* into them, otherwise, a sense of incompleteness is left on the ear. Thus the chord of the dominant seventh must be resolved by the tonic harmony, the major third ascending a semitone to the key-note, and the seventh descending one degree to the third of the key:



The diminished triad is similarly resolved, and all chords immediately derived from the dominant harmony. The chord of the added ninth is resolved by descending a second to the fifth of the tonic:



RESOLUTION OF FORCES. See COMPOSITION.

RE'SOLUTIVE CLAUSE is the technical name given by the law of Scotland to a clause in a deed of entail, the object of which is to declare that if the heir of entail in possession do any of the things which he is expressly prohibited from doing, such as attempting to sell the estate, or alter the order of succession, his right to the estate shall cease, and the estate shall pass on to the next heir.

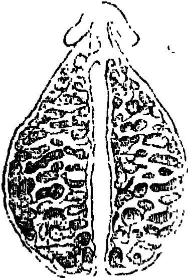
RESPE'CTING, or **RESPECTANT,** in Heraldry, a term used to describe two animals borne face to face. Beasts of prey rampant when so borne, are, however, said to be *rampant combatant.*

RESPIRA'TION, ORGANS AND PROCESS OF. The great objects of respiration or breathing are, first, the introduction into the system of oxygen, by which the products resulting from the disintegration or breaking up of the muscular, nervous, and other tissues of the body are converted into compounds, which are easily eliminated or removed by the excreting organs (as the kidneys, lungs, skin, &c.); and, secondly, the removal of the most noxious, and consequently, the most important of these products, carbonic acid, through special respiratory organs, which, in most air-breathing animals, except insects, are lungs; while in water-breathing animals, excepting those very low in the scale of organisation, they take the form of *branchiæ*, or gills. In all the vertebrated animals, excepting in fishes, and in the amphibians during their young state,* the respiratory organs are more or less complicated internal air-sacs, communicating through the throat with the external atmosphere. The simplest known form in which these LUNGS or internal air-sacs exist is as a pair of elastic membranous bags placed close beneath the vertebral column, communicating with the surrounding atmosphere by a tube known as the windpipe, or *trachea*, which opens through the larynx, or organ of voice, into the throat. These bags are lined by a delicate, thin, and moist membrane, called a mucous membrane, embedded in, and partly beneath which is a vascular network, through which all the blood in the animal's body is in turn driven by the heart. The moist partition between the blood in this network and the air in the interior of the lungs is so thin, that after having (by its moisture) dissolved the oxygen of the air, it permits of its passage into the moving current of blood, whilst through the same agencies carbonic acid simultaneously passes in an opposite direction from the blood into the air. To complete the apparatus, there are certain muscles under whose action the bags are emptied of their vitiated contents, and refilled with pure air. Such are the respiratory organs as they occur in that remarkable animal, the *Proteus anguinus*, found in the dark caves of Carinthia, and belonging to the order *Amphipneusta*, referred to in the foot-note. In the more highly organised animals and in man, we find these elementary essential parts complicated and modified in a great variety of ways. Confining our remarks for the present to the respiratory process as it occurs in man and mammals, we may consider the anatomical details under three different heads. *First*, There must be a special respiratory organ—the lungs—affording by its internal arrangement an immense extent of internal surface, covered by vascular network, through which the blood flows in innumerable minute streamlets, only separated by an extremely thin membrane from the atmospheric air that has been inhaled; *secondly*, There must be such an arrangement of the circulating system that fresh blood may be perpetually driven from the right side of the heart through the lungs, and onward to the left side of the heart; and *thirdly*, There must be arrangements for the frequent and regular change of the air contained in the lungs. These three points will be considered in the order in which we have placed them.

A sufficiently large internal aërating surface might of course be obtained by increasing the size of the air-bags themselves, but this would involve an increase of size in the animal. In examining the lungs of different animals, two plans are observed for increasing the internal surface without increasing the total bulk of the lungs.

* A few of the amphibians, such as the species of the genera *Proteus* and *Siren*, retain their branchiæ during their whole life; hence they are placed in the order *Amphipneusta*, a term indicating their double mode of breathing.

According to one plan, the internal surface is, as it were, moulded into cells, separated laterally by partitions, somewhat like the cells as seen in a section of honeycomb, or more like the appearance presented by the second or honeycomb stomach of ruminating animals; according to the other, enormous multitudes of little lung-sacs partitioned, as will be presently shewn, in their interior, are clustered round the ultimate branch of a common air-tube, which communicates with all of them. If we can conceive a bunch of grapes with its stem and all its minute branches, and the grapes attached to the ends of these branches completely hollow, we get a good idea of this second plan, except in so far as the partitioning of the terminal cells (the grapes in the illustration) is concerned. By the former method, which occurs in amphibians and reptiles, the lung-sacs are merely rendered more cellular in their interior; whilst, by the latter plan, compound lungs are formed, such as occur in birds and mammals, including man. Hence these two varieties of lung-structure correspond to the so-called cold-blooded and warm-blooded animals respectively. In fig. 1, representing a section of the lungs of the frog (magnified), and in fig. 5 of the art. REPTILES, representing a section of the lungs of a turtle (diminished), we have illustrations of the first plan (the cellular lung-sac), while in figures 2 and 3 we have diagrammatic illustrations of the human lung. Figure 2 is a shaded diagram (copied from Mr Marshall's admirable series of *Physiological Diagrams*), to shew the ramifications of the air-tubes in the human lungs. L is an outline representing the left lung; T, the main air-tube, called the windpipe or *trachea* (so called from the Greek word *tracheia*, rough, and similarly termed in Latin the *Arteria aspera*, although not an artery, as we now employ the word), descends through the neck from the larynx or organ of voice into the chest; B shews the right and left *bronchi*, or primary divisions into which the windpipe separates, one for each lung. Each bronchus enters the lung at the so-called root, and divides and subdivides into smaller branches, which never coalesce, but continue separate, like the branches and twigs of a tree. These are the *bronchial tubes*, or the *bronchiæ* of some writers; the smallest shewn in this diagram, *b*, *b*, undergo many further subdivisions, until (to use Mr Marshall's own description) 'at length they form an immense number of minute tubes, not more than $\frac{1}{40}$th of an inch in diameter, each of which ends in a cluster of cells, or, as it may otherwise be described, opens into a small membranous sac, a little wider than itself, having a cellular internal surface very similar to that of the frog's lung, but of course on a microscopic scale.' In fig. 3. (also copied from Mr Marshall's diagrams), there is a representation, magnified about 100 diameters, of three of these clusters of cells, or little lung-sacs, from the human lung. In this figure, *b* is a small air-tube, or bronchial tube, from which several of the finest or ultimate tubes proceed; *c* shews the outer surface of one of the lung-sacs, or *lobules*, as they are commonly termed; *d*, the inner surface of another, which has been cut open, so as to shew the ultimate recesses of the lung to which the air has access—viz., the *air-cells*. According to Rossignol, the ultimate bronchial ramifications terminate in a shape resembling that of an inverted funnel, and hence he applies the term *infundibula* to these endings. In fig. 4 (copied from Rossignol's *Memoir*), there is a representation of the termination of an ultimate bronchial tube in the lung of a dog: *a* represents an ultimate tube, or lobular passage, branching towards the infundibula; *b* is the interior of one of the seven infundibula shewn in the figure; while *c* represents one of the numerous septa or partitions projecting inwards on the infundibular wall, and forming the air-cells. According to Todd and Bowman, the diameter of the lobular passages is from $\frac{1}{150}$th to $\frac{1}{200}$th of an inch, while that of the cells ranges from $\frac{1}{200}$th to $\frac{1}{300}$th of an inch. It is on the inner surface of these air-cells that the network of minute capillaries is spread in which the act of aëration takes place. Each lobule receives air through its own bronchial tube alone, and consequently there is no direct communication between the air-cells of adjacent lobules. These lobules are closely compressed upon one another; and collectively, together with the connective tissue which unites them to one another, make up the great mass of the lungs. To such an extent is the process of subdivision carried out, that, according to calculation, the lungs of an adult man contain at least 600 millions of these air-cells. It is in consequence of the air included in these cells that the pulmonary tissue has a soft spongy feel, and crackles when compressed between the fingers (see RESPIRATORY SOUNDS); and for the same reason, the lungs, and even small portions of them, even after strong pressure, float in water, it being extremely difficult to drive all the air out of the cells. The lungs (except in the fœtal state, when no air enters them) are thus the lightest


Fig. 1.

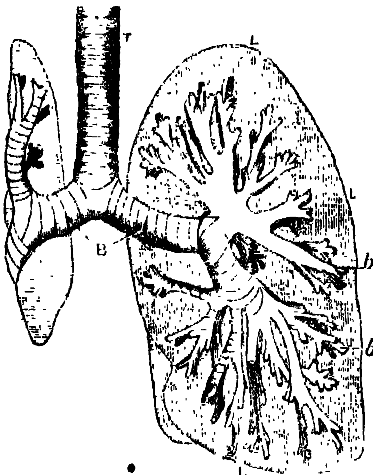


Fig 2.

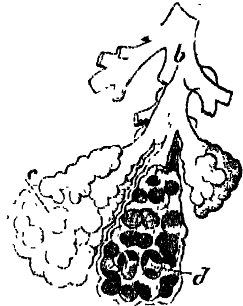


Fig. 3.



Fig. 4.

organs, in relation to their size, in the body. Although their bulk is so great that, with the heart, they occupy almost the whole of the cavity of the chest, they only weigh about three pounds and a half in men, and two pounds and three-quarters in women. Their colour varies at different ages. At birth, they are of a pinkish white tint; in adult life, they are of a slate colour, and present a mottled appearance; and in old age, they become of a still darker tint. The polygonal markings which are seen on the surface correspond to the outer surface of the lobules already noticed. Their shape is adapted to that of the cavity in which they are lodged, each lung being conical in form, with its apex rising into the neck; while its base, which is broad and concave, rests upon the convex surface of the diaphragm; and between the two lungs lie the heart and the great vessels that proceed from it. During life (except in certain diseases, as for instance, PERICARDITIS, q. v.), the inner margins of the lungs nearly overlap the heart, leaving only a roundish space, less than two inches in diameter, of that organ uncovered, while their lower borders extend to the cartilages of the ribs, and fit into the angle formed between those cartilages and the diaphragm. Each lung is invested by its own serous membrane, the PLEURA (q. v.), which serves the double purpose of facilitating the movements which the lungs undergo in the act of respiration, and of suspending each lung in its proper position. In the latter function, the pleuræ are essentially assisted by the great air-tubes and blood-vessels, which collectively form what are termed the roots of the lungs.

The structure of the air-tubes and the lungs themselves next requires consideration. Beginning with the upper portion, we have to consider the *trachea*, or windpipe, which in the human subject descends in the middle line from the Larynx (q. v.) to the level of the third dorsal vertebra, where it divides into the right and left bronchi (as seen in fig. 2). It is kept permanently open by from 16 to 20 cartilaginous rings, which surround two-thirds of the tube, and are incomplete behind, where the tube is completed by the same fibrous membrane which covers and unites the cartilages in front and on the sides. In this fibrous membrane are numerous tracheal glands (which probably furnish much of the vapour of the breath, and may occasion its odour), together with unstriped muscular fibre, to which the term *trachealis* muscle has been given. The trachea measures about 4½ inches in length, and is about three-quarters of an inch wide. Its mucous membrane is continuous through the glottis with that of the pharynx or throat, and is covered with ciliated columnar Epithelium (q. v.). Of the bronchi, the right is wider, shorter, and more horizontal than the left. Their walls are composed on the same plan as those of the trachea. Upon entering the lung, each bronchus divides in the method already described. The walls of these bronchial tubes become thinner as they approach the air-cells. The cartilaginous portions which, in the primary divisions of each bronchus, partially retained the annular form, become gradually reduced to mere flakes, and finally cease in tubes of ⅛th or $\frac{1}{10}$th of an inch in diameter. The unstriped muscular fibres occurring in the trachea are continued downwards to the minutest tubes, forming a very thin layer, completely surrounding the canal, and the ciliated epithelium extends equally far. The terminal bronchial tube loses its epithelium and muscular coat at about ⅛th of an inch from the most distant air-cell to which it leads, and is thus reduced to a single coat, consisting of the basement membrane (see MUCOUS MEMBRANE), with yellow elastic fibres blended with it. Of this structure, the interlobular passages and the air-cells are composed.

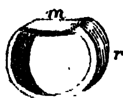


Fig. 5.—A separated Tracheal Ring.
r, representing the cartilaginous, and *m* the posterior flattened membranous portion.

The mode in which the blood is perpetually changed in the lungs next demands consideration. The venous or impure blood collected from all parts of the body in the right side of the heart, is conveyed to the lungs by the pulmonary artery, which is about the size of the aorta, and, like that vessel, is furnished with three semilunar valves at its origin, which prevent the blood from regurgitating into the right ventricle of the Heart (see CIRCULATION). The pulmonary artery divides, before entering the lungs, into a right and a left branch, which ramify as far as the lobules in company with the bronchial tubes. At this point, they distribute themselves on the outside of the lobules, in the so-called *interlobular fissures*, and penetrating between the air-cells, form a capillary network on and in the walls of the cells and of the lobular passages. This network empties its blood, which is now aërated, into minute venous radicles, which converge to form larger veins, and these finally form the four pulmonary veins, which discharge their arterialised blood into the left side of the heart. The walls which support the capillary network of the lungs are (as Todd and Bowman observe) 'for the most part much too thin to enclose the capillaries between the two layers of their substance, and therefore the capillaries project fairly into the air cells by a great part of their circumference, being adherent to the wall by a narrow line only. The capillary wall is thus exposed and bare, in contact with the air of the cell, and nothing besides the delicate membrane of the capillary intervenes between the air and the blood. A capillary frequently passes through an aperture in the cell-wall, so as first to project into one cell, and further on into a contiguous one, but never becomes altogether free from the wall.'—*Phys. Anat.* v. ii. p. 393. The diameter of these capillaries is about $\frac{1}{1500}$th of an inch, which is comparatively large, and admits of the passage of blood freely; and the air and the blood may be said to be in contact, since they are only separated by a delicate capillary wall, less than $\frac{1}{20000}$th of an inch in thickness. If the rate of the blood in the capillaries be taken at an inch and three-quarters per minute (according to the estimate of Valentin, drawn from observation of the frog's foot), it has been calculated that the blood would at each circuit remain in contact with the air about one second and a half. In all probability, however, the motion of the blood is quicker in the pulmonary capillaries of man and other mammals and of birds than in those of the frog's foot.

In addition to the pulmonary artery and pulmonary veins, which convey the blood to and from the lungs for the purpose of aëration, there are other vessels, known as the bronchial vessels, for the nutrition of the lung itself, the distribution of which, and their mode of communication with the pulmonary vessels already described, have been subjects of much discussion; but into this we need not enter. The lungs are supplied with nerves from the anterior and posterior pulmonary plexuses, lying at the root of the organ, and composed of filaments of the pneumogastric and sympathetic nerves. The filaments from these plexuses

accompany the bronchial tubes, in which they are finally lost. The part which these nerves play in the respiratory process will be considered after we have described the *movements of respiration*, by which the air in the lungs is being perpetually changed.

For a description of the shape and framework of the chest, see CHEST. The chest (or thorax, as it is termed by anatomists) is so constructed as to be capable of enlargement in height (vertically), in depth (or from the front backwards), and in width (or from side to side). Its height is increased mainly by the descent of the diaphragm, and to a certain extent by the elevation of the ribs, and the widening of the intercostal spaces; while its depth and width are increased by the elevation of the ribs, which carry forward and elevate the breast-bone (or sternum), especially at its lowest end, and are slightly rotated on an imaginary axis, joining their extremities, by which their central portion is raised, and slightly removed from the mesial plane of the chest. It is only in forced or deep inspiration that all these means of enlarging the chest are called into play. An ordinary inspiration is attended in men with very slight elevation of the ribs (about one-twentieth of an inch), while in women the elevation is much greater, especially in the upper ribs; the cause of this difference in the sexes probably lying in the narrower waist of the female requiring a compensation in the upper part of the chest. MM. Beau and Maissiat describe three varieties of ordinary respiration—viz., 1. Abdominal, or that chiefly effected by the diaphragm, and seen in the motion of the walls of the belly; 2. Costo-inferior, or that in which the seven lower ribs are observed to act; and 3. Costo-superior, or that effected in a considerable degree by the upper ribs. The first variety occurs in infants up to the end of



Fig 6.

Diagrams (by Hutchinson) shewing the extent of antero-posterior movement in ordinary, and in forced respiration in male and female. The back is supposed to be fixed, in order to throw forward the movement as much as possible. The black line indicates, by its two margins, the limits of *ordinary inspiration* and *expiration*. In *forced inspiration*, the body comes up to the dotted line, while in *forced expiration* it recedes to the smallest space indicated.

the third year, and in males generally; the second in boys after the age of three, and in men; and the third in adult females. The difference between the depth of a forced and an ordinary inspiration is shewn in the accompanying figures. Our limited space precludes a detailed notice of the various muscles which are concerned in respiration. The total power of the respiratory muscles has been measured by several physiologists, amongst whom Dr Hutchinson deserves special notice. He finds, as the average of 1500 experiments, that the power of expiration is nearly one-third stronger than that of inspiration, and he is of opinion that when the expiratory are not stronger than the inspiratory muscles, some disease is present. He tested the force of the two classes of respiratory muscles by causing persons to make the most powerful efforts of which they were capable, when breathing through the nose into an instrument termed a spirometer, and by this means he found that men of five feet seven or eight inches in height have the greatest inspiratory power, it being equal, on an average, to a column of mercury of 2·75 inches, while their expiratory power was equal to 3·97 inches. The following table is given by him as exhibiting the range through which these powers may vary within the limits of health:

Power of Inspiration.		Power of Expiration.
1·5 inches	Weak	2·0 inches
2·0 "	Ordinary	2·5 "
4·5 "	Remarkable	5·8 "
7·0 "	Very extraordinary	10·0 "

The co-operation of the resilience of the lungs and the elasticity of the walls of the chest with the expiratory muscular movement, is probably the cause why the expiratory power, as tested by the height of a column of mercury, is greater than the inspiratory power. Dr Hutchinson calculates that a man who raises three inches of mercury by an effort of inspiration exerts a force equal to 1000 lbs.; while the one remarkable case in which the mercury rose to seven inches, indicated a force of 2200 lbs., or nearly two tons.

The following points in connection with the respiratory movements require notice. Every complete act of respiration is divisible into four parts—viz., 1. Inspiration; 2. A short pause, not always observed; 3. Expiration; and 4. A considerable pause, occupying, according to Vierordt, about one-fifth of the whole time required for one complete respiratory act. The act of expiration is always more prolonged than that of inspiration, the former being to the latter in the ratio of 12 : 10 in adult males, and as 14 : 10 in children, women, and aged persons. The number of respiratory acts performed in a minute varies at different ages. According to Quetelet, at birth there are 44 respirations in one minute; at 5 years of age, 26; from 15 to 20, 20; from 20 to 25, 18·7; from 25 to 30, 16; from 30 to 50, 18·1: so that from 16 to 20 may be taken as the ordinary range for healthy adults, although Hutchinson gives the wide range of from 6 to 40. The average ratio which the number of respirations bears to the number of pulsations in a given time is about 1 : 4½, and if there is any great deviation from this ratio, there is probably some obstruction to the aëration of the blood, or some disorder of the nervous system. Thus, in pneumonia (or inflammation of the lungs), in which a greater or less amount of pulmonary tissue is unfitted for its office, the number of the respirations increases in a more rapid proportion than the number of pulsations, so that the ratio becomes as 1 : 3, or even as 1 : 2. In hysteria, a similar or even greater deviation from the normal ratio may occur; and Elliotson records a case in which the respiratory movements were 98, or even 106, whilst the pulse was 104. On the other hand, in certain typhoid conditions, and in narcotic

poisoning, the respiratory acts are diminished in number; the ratio of respiration to pulsations being as 1 : 6, or even 1 : 8.

We have next to inquire into the mode in which the muscular movements of respiration are kept up by nervous power. 'There can be no doubt,' says Dr Carpenter, 'that these movements, though partly under the control of the will, are essentially "automatic" in their nature. Their chief centres consist of two ganglia; corresponding to the origins of the pneumogastric nerves, which are the principal excitor nerves which convey the stimulus on which these movements are dependent; whilst from the adjacent parts of the medulla oblongata and spinalis proceed the chief motor nerves by which they are carried into effect. And thus it happens that the whole of the encephalon may be removed from above, and the spinal cord (as far up as the origin of the phrenic nerve) from below, without suspending the most essential of the respiratory movements.'—*Principles of Human Physiology* (6th edit., 1864, p. 274). It would carry us far beyond our assigned limits to notice the interesting series of phenomena that follow the division or irritation of the various branches of the pneumogastric nerve. We may, however, mention that when the trunks of this nerve are divided on both sides, the respiratory movements still go on, although with diminished activity. Hence, there must be other excitors to the action of the respiratory muscles. Amongst these, the nerves distributed to the general surface, and particularly to the face, probably perform an important part; and in exciting the first inspiration, the fifth pair seem the principal agent. In support of this view, Dr Carpenter adduces the well-known fact, that the first inspiratory effort of the new-born infant is most vigorously performed when the cool external air comes in contact with its face. Dr Marshall Hall, in his *New Memoir on the True Spinal Marrow*, p. 29, relates a case in which the first inspiration was delayed simply because the face was protected from the atmosphere by the bed-clothes; the instant they were lifted up, the infant breathed. Many familiar facts demonstrate the influence of the superficial nerves on the respiratory system in the adult as well as in the infant. 'Every one,' to use Dr Carpenter's words, 'knows that the first plunge into cold water, or the first descent of the stream of the shower-bath, or even the dashing of a glass of cold water in the face, will produce inspiratory efforts; and this fact has many important practical applications. Thus, in the treatment of asphyxia, whether congenital or the result of narcotic poisoning, drowning, &c., the alternate application of cold and heat is found to be one of the most efficacious means of restoring the respiratory movements; and a paroxysm of hysterical laughter may be cut short by dashing a glass of cold water in the face.' The principal motor or efferent nerves concerned in bringing out the respiratory movements are the phrenic, going to the diaphragm; the intercostal, supplying the intercostal muscles; the facial and the spinal accessory nerves; although, as has been already mentioned, the superficial nerves generally exert a motor or efferent action.

How far the respiratory movements are under the influence of the will, is a question which has given rise to much discussion. That, in their ordinary mode of performance, they are independent of the will, is obvious from their systematic occurrence during sleep, in cases of paralysis in which the power of the will is lost, in apoplexy, &c. At the same time, universal experience teaches us that these movements are partly but not entirely, under the control of the will. We can, with little inconvenience, suspend the respiratory actions for a minute or even longer, if we have previously introduced into the lungs a full supply of fresh air; but if the suspension be further prolonged, the stimulus conveyed by the excitor nerves to the nervous centres becomes so strong, that by no effort of the will can we avoid making inspiratory efforts. It is asserted by M. Bourdon, an eminent French physiologist, in his *Recherches sur le Mécanisme de la Respiration*, that no person ever succeeded in committing suicide by simply holding the breath, but that such persons have attained their object by holding the face under water, because here another set of muscles is called into play, which are much more under the control of the will than those of respiration. If we may venture to seek for the reason why, in man and the higher animals, the respiratory actions are placed under the direction of the will, it may probably be found in the necessary physiological connection that exists between them and the production of those vocal sounds by which individuals (whether men or animals) can communicate their feelings and wishes to one another.

We shall complete the subject in so far as human physiology is concerned, by noticing (1) the greatest quantity of air that can be expelled by a forcible expiration; (2) the total quantity that passes through the lungs in a given time; (3) the effects of respiration on the air; and (4) the effects of suspension or deficiency of respiration.

When the lungs have been emptied as much as possible of air by the most powerful expiratory effort, they still contain a quantity over which we have no control, and which may be estimated at about 40 cubic inches.* To this portion of the contents of the lungs the term *Residual Air* is applied. In addition to this residual air, physiologists distinguish, in connection with the respiratory process, *Supplemental Air*, which is that portion which remains in the chest after an ordinary gentle expiration, but which may be displaced at will; *Breathing* or *Tidal Air*, which is the volume that is displaced by the constant gentle inspiration and expiration; and *Complemental Air*, or the quantity which can be inhaled by the deepest possible inspiration, over and above that which is introduced in ordinary breathing. The greatest volume of air that can be expelled by the most powerful expiration, which is obviously the sum of the supplemental, breathing, and complemental air, is designated as the *Vital Capacity*—a term originally introduced by Dr Hutchinson, the inventor of the spirometer, who found, from nearly 5000 observations, that of all the elements or factors which might be supposed to influence it, *height* alone stood in a definite and constant relation to it, this relation being expressed by the rule, that, 'for every inch of stature from 5 to 6 feet, 8 additional cubic inches of air (at 60° Fahr.) are given out by a forced expiration after a full inspiration.' Thus, the vital capacity for a man from 5 feet to 5 feet 1 inch being 174 cubic inches, that for a man from 5 feet 1 inch to 5 feet 2 inches is 182 cubic inches; and so on. With regard to bodily weight as a factor, Dr Hutchinson found, that 'when the man exceeds the average weight (at each height) by 7 per cent., the vital capacity decreases 1 cubic inch per pound for the next 35 lbs. above this weight.' Age and muscular development do not influence the result so much as might have been expected. It has been not unfrequently observed that the vital capacity is small in athletic men, and that it has

* According to Hutchinson, as will be presently seen, this estimate is far too small.

been in excess in persons by no means remarkable for physical power. The *maximum* vital capacity met with by Dr Hutchinson was 464 cubic inches; this was in a man 7 feet high, whose weight was 308 lbs.: the *minimum* was 46 cubic inches, and occurred in the case of a dwarf whose height was only 29 inches, and who weighed 40 lbs.

In estimating the effects of the respiratory process upon the air which passes through the lungs, we shall adopt the *data* afforded by the recent observations of Dr Edward Smith, who has arranged a spirometer by which the quantity of air inspired may be registered from 1 to 100,000 cubic inches, and therefore for any period. This instrument, says Dr Carpenter (to whom Dr Smith has communicated many of the following statements for insertion in the new edition of his *Human Physiology*), 'he has used for 24 hours without intermission, except for meals, and he has ascertained the quantity of air inspired during sleep and in almost every condition met with during the day. From numerous experiments upon several persons, each extending over a whole day, he found that the average depth of inspiration was 33·6 cubic inches when at rest; and when walking at 1, 2, 3, and 4 miles an hour, 52, 60, 75, and 91 cubic inches, and even 107 cubic inches when working the treadmill. If we take 30 or 40 cubic inches as the average quantity exchanged at each respiration, we cannot but observe how small a proportion it bears to the entire amount which the lungs usually contain, for the "residual air" which cannot be expelled is estimated by Dr Hutchinson at from 75 to 100 cubic inches; and the "supplemental air," which can only be expelled by a forced expiration, is about as much more; the sum of the two being from 150 to 200 cubic inches, or from 5 to 7 times the "breathing volume."' Now, it is obvious that if no provision existed for mingling the air inspired with the air already occupying the lungs, the former would penetrate no further than the larger air-passages, and as this would be again thrown out at the next expiration, the bulk of the air contained in the lungs would remain altogether without renewal, and the expired air would not be found to have undergone any change. The law of the *Diffusion of Gases* (q. v.) here comes in play, for the air in the air-cells and finer tubes being charged by the respiratory process with a great excess of carbonic acid, as compared with the inspired air contained in the larger tubes, a diffusion of the carbonic acid necessarily takes place in the outward direction, while the oxygen from the air, or the air itself, similarly diffuses itself in an opposite direction, towards and into the air-cells themselves.

The *total amount* of air which passes through the lungs in 24 hours must obviously vary with the extent and frequency of the respiratory movements. Dr Smith found that during the day (6 A. M. to 12 P. M.), the average quantity of air inspired by several persons at rest was 502 cubic inches per minute, or a total of 542,160 cubic inches; and as the average quantity during the night was about 400 inches per minute, the total daily amount was 686,000 cubic inches. This quantity is largely increased by exertion, and Dr Smith computes that the total amount actually respired by the unoccupied gentleman, the ordinary tradesman, and the hard-working labourer, would be 804,780, 1,06?,840, and 1,568,390 cubic inches respectively.

The *alterations* in the inspired air affected by respiration consist essentially in the removal of a portion of the oxygen, and its replacement by a nearly corresponding bulk of carbonic acid. The amount of carbonic acid in the expired air varies inversely with the number of respirations; it reaches 5·5 per cent. (or more) when the respirations are only 6 in the minute, while it falls as low as about 2·6 per cent. when the respirations are 96 in the minute. About 4·35 per cent. of carbonic acid is, on an average, added to the air in ordinary respiration; whilst about 4·782 per cent. of oxygen is removed; the actual diminution of bulk of the expired air (after the removal of the moisture obtained from the lungs) being about $\frac{1}{40}$th of its volume. Hence, unless where there is free ventilation, the air in an apartment containing men or animals must soon become vitiated by containing a great excess of carbonic acid (for ordinary atmospheric air only contains about one part of carbonic acid in 2500 parts), and a deficiency of oxygen. The absolute quantity of carbonic acid (and consequently of carbon) exhaled in 24 hours is liable to great variations, caused by the temperature and moisture of the air, age, sex, muscular development, the nature and quantity of the food, muscular exercise, sleep, state of health, &c. Dr Smith calculates that an adult man in a state of rest exhales in 24 hours an amount of carbonic acid equivalent to 7·144 oz. of carbon; and he estimates that it should be increased to 8·68 and 11·7 oz. for the non-labouring and laborious classes respectively, at their ordinary rate of exertion. We may add, that the total amount of carbonic acid is greatly increased by external cold, and diminished by heat; that it is increased by a moist, and diminished by a dry atmosphere; that it increases in both sexes to about the 30th year, when it remains stationary for 15 years, after which it diminishes; that at all ages beyond 8 years it is greater in males than in females, and that it increases during pregnancy; that it is greater in robust than in slender men, the quantity of carbon expired per diem to each 1 lb. of bodily weight being (according to Smith) 17·07, 17·51, and 17·99 grains at 48, 39, and 33 years of age respectively; that it is greatly increased by eating,* and is diminished by fasting; that it is increased by muscular exertion (Smith found that when walking three miles an hour he excreted 2·6 more carbonic acid than when at rest; while tread-wheel labour occasioned about double the excretion that was caused by walking); that it is diminished by sleep; and that it is increased in the exanthematous fevers (measles, small pox, scarlatina, &c.), and in chlorosis; while it is diminished in typhus and in chronic diseases of the respiratory organs.

There has been much discussion with regard to the extent to which the nitrogen of the air is affected by respiration. Usually a small amount of this gas is given off, but the quantities absorbed and exhaled so nearly balance each other, that its special action on the organism must be very trifling, further than as being a diluter of the oxygen, which would be too stimulating if breathed in a pure state. We therefore proceed to the consideration of the watery vapour with which the exhaled air is saturated. The amount of this fluid exhaled in 24 hours may range from about 6 to 27 oz., its usual range being between 7 and 11 oz. It is not pure water, but holds in solution a considerable amount of carbonic acid and an albuminous substance in a state of decomposition, which, on exposing the fluid to an elevated temperature, occasions a very evident putrid odour.

RESPIRATION, Artificial, is required in all cases of suspended animation, from drowning,

* We regret that our limited space totally precludes us from noticing Dr Smith's laborious investigations on the effect of different kinds of food and drink on the excretion of carbonic acid. The reader will find them described in several of the recent volumes of the *Philosophical Transactions.*

noxious gases, chloroform, &c. It may be performed either by forcing air into the lungs by means of a pipe passed through the mouth or the nostril into the glottis, or (which is usually preferable) by imitating the natural expansion of the chest by muscular effort, as by the methods invented by the late Dr Marshall Hall and by Dr Sylvester.

The best mode of forcing air into the lungs is by the use of a small pair of bellows, with the nozzle inserted in one of the patient's nostrils. The air should be driven into the lungs with extreme gentleness, the larynx being pressed backwards against the spine, so that the air may not go into the œsophagus and stomach. Gentle but firm pressure must be then applied to the chest to expel the introduced air, and fresh air again driven in; and this process of introducing and expelling the air alternately must be continued until either natural respiratory efforts appear, or the case becomes hopeless.

In the article ASPHYXIA it is stated that the best method of filling the lungs of an asphyxiated person (as, for instance, a person apparently drowned) with fresh air, is that of Dr Marshall Hall. Dr Sylvester's method (*The True Physiological Method of Restoring Persons apparently Drowned or Dead, and of Resuscitating Still-born Children*, London, 1859) is now generally regarded as decidedly preferable to that of Dr Marshall Hall, although the same in principle. The following are Dr Sylvester's rules, as slightly modified by a committee, whose investigations will be presently noticed. The patient is laid on his back on a plane, inclined a little from the feet

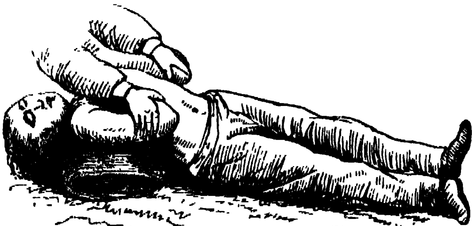


Fig. 1.

upwards; the shoulders are gently raised by a firm cushion being placed under them; the tongue is brought forward, so as to project a little from the side of the mouth. The operator then grasps the patient's arms just above the elbows, and raises them till they nearly meet above the head. This action



Fig. 2.

imitates inspiration. The patient's arms are then turned down, and firmly pressed for a moment against the sides of the chest. A deep expiration is thus imitated; and these two sets of movements should be perseveringly continued at the rate of about 15 times in a minute.

Two important documents on this subject have appeared since the publication of the article ASPHYXIA. The first of these is the *Report of the Scientific Committee on Suspended Animation*, presented to the Royal Medical and Chirurgical Society of London in July 1862; and when it is stated that this Report was signed by 'C. J. B. Williams, *Chairman*, W. S. Kirkes, George Harley, J. B. Sanderson, C. E. Brown Sequard, H. Hyde Salter, E. H. Sieveking, and W. S. Savory, *Honorary Secretary*,' its scientific claims to our attention are undeniable. The following are their suggestions in relation to treatment: 1. That all obstruction to the passage of air to and from the lungs be at once, so far as is practicable, removed; that the mouth and nostrils, e. g., be cleansed from all foreign matters or adherent mucus. 2. That in the absence of natural respiration, artificial respiration by Dr Sylvester's method (as already described) should be employed. 3. That if no natural respiratory efforts supervene, a dash of hot water (120° Fah.) or cold water be employed, for the purpose of exciting respiratory efforts. 4. That the temperature of the body be maintained by friction, warm blankets, the warm bath, &c. [Whether the warm bath is serviceable or positively hurtful is, however, still an open question]; and 5. That in the case of drowning, in addition to the foregoing suggestions, the following plan may, in the first instance, be practised: Place the body with the face downwards, and hanging a little over the edge of a table, shutter, or board, raised at an angle of about 30°, so that the head may be lower than the feet. Open the mouth, and draw the tongue forward. Keep the body in this posture for a few seconds, or a little longer if fluid escapes. The escape of fluid may be assisted by pressing once or twice upon the back.

The other document to which we referred is entitled *Instructions for the Restoration of the apparently Dead from Drowning*, and was issued in 1864 by 'The National Lifeboat Institution.' In these *Instructions* (a copy of which should be in the possession of every family), it is recommended, that if breathing cannot be excited by the application of stimulants to the nostrils, or by dashing water on the face, Marshall Hall's method should be tried; and that if this do not prove successful in from two to five minutes, Dr Sylvester's method should be resorted to.

In conclusion, a reference must be made to the *Reports of the Scientific Committee* [of the members of the Royal Medical and Chirurgical Society] *on the Uses and Effects of Chloroform.* The committee decide that the most certain means of restoring life after poisoning with anæsthetics is by artificial respiration. 'By this means, resuscitating may generally be accomplished after natural respiration has ceased, provided the heart continue to act; and it may *sometimes* be effected even after the cessation of the heart's action. Galvanism resuscitates within the same limits as artificial respiration; it is, however, far less to be relied on in equal cases. Galvanism may be used in addition to artificial respiration; but the latter is on no account to be delayed or suspended, in order that galvanism may be tried.'—*Proceedings of the Royal Medical and Chirurgical Society*, vol. iv. 1864.

RE'SPIRATOR, is the name given by its inventor, Mr Jeffreys, to an instrument which gives warmth to the air drawn into the lungs in breathing. It is attached to the mouth, and is composed of several layers of very fine wire, fixed so near together, that the exhaled air passing through

them is diffused over a very large amount of surface, its warmth being absorbed by the metal, which, being an excellent conductor of heat, freely returns it to the cold air, drawn in through it in the act of inspiration. Mr Jeffreys considers it necessary that about twenty layers of metal-work should be used, and in order to make the instrument as light and compact as possible, each layer must be extremely thin. The apparatus usually consists of from eight to twelve frames of sheet-silver or other metal, about 3¼ inches long, 1½ inch wide, and $\frac{1}{350}$th of an inch thick, the metal of which is pierced away by machinery so as to leave only a narrow framework, consisting of six vertical bars $\frac{1}{50}$th of an inch wide, and five horizontal bars, with a width of $\frac{1}{50}$th of an inch thick. To each side of each of these frames is soldered a layer of wires 1½ inch long, and $\frac{1}{450}$th of an inch thick. These wires are laid at about $\frac{1}{200}$th of an inch apart, and are so numerous, that a large respirator of high power contains 2000 feet of wire, divided into about 12,000 pieces, and soldered to the frames at more than 80,000 points. The frames, of wire-work, are fixed parallel to each other, and kept a small distance apart by small knots of a bad conductor of heat, so that the inner layer is always kept at almost the temperature of the expired air, and each successive layer diminishes in warmth, till the outer one is nearly as cold as the external air. By this arrangement, the air that is inhaled meeting with layers of wire of gradually increasing heat, is raised in the most powerful respirators to the highest attainable temperature. Such respirators have twenty-four layers of wire-work, those of medium power sixteen, and the weakest eight. The whole of the wire-work is curved, so as to fit closely to the face, and is enclosed in a border or case of soft leather; and an outer coat, usually of a very fine and open woollen fabric, is added. The form of instrument chiefly used is fixed over the mouth, and is named *The Oral Respirator*. For an instrument to cover both the mouth and nostrils, the term *Ori-nasal Respirator* is used. As defective and imperfect imitations of Mr Jeffreys' respirator have been advertised, the original inventor has recently superadded the word *Pneumoclime*, or 'Climate for the Lungs,' to all the respirators for which he holds himself responsible. The use of these instruments in allowing persons with delicate lungs to take out-of-door exercise with safety and advantage in comparatively severe weather, is now universally recognised by the medical profession.

RESPI'RATORY SOUNDS, are of the greatest importance in the diagnosis of the diseases of the lungs. They may be divided into (1) those directly resulting from inspiration and expiration, and (2) those of the voice, including coughing.

In the healthy state of the lungs, two distinct sounds are heard, on applying the ear, either directly or through the intervention of the stethoscope, to the walls of the chest—one called the *vesicular sound*, because it is supposed to be caused by the passage of the air from the ultimate tubes into the air-cells or vesicles; and the other the *bronchial sound*, because it is generated in the bronchial tubes by the air moving through them.

The vesicular sound, known also as the *respiratory murmur*, is mainly produced during inspiration, being very faint, and sometimes scarcely perceptible during expiration. It is rather a rustle than a murmur, and has been compared to the sighing of a gentle breeze amongst leaves, to the sound made in the deep inspiration of a sleeping person, &c.; but a single minute's application of the ear to the chest of a healthy person below the collar-bone, will give a clearer idea of its true nature than any mere description could convey. The sound is more distinct in thin than in fat persons, in women than in men, and in children than in adults. Indeed, it is so loud in children, that when an unusually noisy sound is heard in an adult, it is said to be *puerile*. The *bronchial sound* has a blowing character, such as may be produced by blowing air quickly through a tube, and is altogether distinct from the former. It may be most clearly heard over the trachea or windpipe, and at the upper part of the sternum or breast-bone.

Such are the sounds as they occur in the healthy lungs. In disease, any change which tends to impair the respiratory function in one part of the lungs, will make the vesicular murmur abnormally weak there, and abnormally loud in the remainder; and there are other changes, besides a mere increase or decrease of intensity, that sometimes occur, and into which we have no space to enter. The bronchial sound is also liable to morbid alteration; for example, it may be heard in parts of the chest where it is usually inaudible, in consequence of condensation of the surrounding pulmonary tissue, or from dilatation of the tubes, independently of condensation; and in violent dyspnœa, it may sometimes be heard over the whole chest without any change of structure. These morbid sounds are only modifications of those which occur in health. There are, however, other sounds generated by disease which are highly important in diagnosis. These are termed *Râles* by the French, and *Rattles*, *Sibilus*, *Rhonchus*, &c., by those English writers who do not adopt the French term. They may be briefly divided into the *dry* and the *moist râles*, the former being caused by the passage of the air, with increased rapidity, through narrowed portions of the bronchial tubes; while the latter are formed by the passage of air through a fluid of more or less tenacity in the bronchial tubes, causing the formation of a succession of bubbles, whose bursting occasions the sound.

There are two other morbid sounds connected with the respiratory system which deserve to be named in this list, viz., *metallic tinkling* and the *friction sound*. Metallic tinkling is a quick and sharp sound, resembling that produced by striking a glass vessel with a pin. Its occurrence affords evidence of the existence of a cavity of considerable size, containing air, and surrounded by firm walls; but how the sound is produced is not definitely settled. The friction sound is produced by the rubbing together of the pulmonary and costal pleuræ when rough from inflammatory action, and is indicative of pleurisy.

RESPO'ND, in Gothic Architecture, a half-pier attached to a wall, and supporting an arch, &c.

RESPO'NDENT is the name of the party against whom another party presents a petition to a court which requires to be answered. The word is used in England as well as in Scotland, but more frequently in England.

RESPONDE'NTIA is a mode of raising money by a master of the ship in critical and desperate circumstances, when he has no other means of doing so, and when the object is to rescue or save the ship and cargo for the benefit of all parties. He goes to a person who advances a sum of money, and takes a mortgage of the goods or cargo, but in such a way that if the goods never arrive, the creditor loses his whole security, and cannot claim repayment from the owner of the ship. When money is borrowed in a similar way on the security of the ship itself, it is called Bottomry (q. v.). In both cases the security is in the form of a bond.

RESPONSORIES (Lat. *responsorium*, a response),

short sentences, generally verses or portions of verses from Scripture, which are assigned in the church services, to be answered by the people to the officiating clergyman. Responsories are appended to lessons, to chapters, and to versicles, in common with which they are either chanted or simply repeated, according to the nature of the service. They are found in all the ancient liturgies, and occur also in the Book of Common Prayer. In the latter the name given to them is RESPONSE; but in the ancient service-books, as well as in the modern Breviary, they are called as above.

REST, in Heraldry, the name usually given to a charge of the form indicated in the subjoined figure, varying, however, considerably in different representations. It appears at too early a date to be what it is often said to be—a spear-rest. It is sometimes called an organ-rest, and in old rolls, a clarion—and is most likely a representation of some musical instrument like the Pandean pipe. It was a rebus-badge of the Clares.


Rest.

REST, in Music, an interval of silence occurring in the course of a movement between one sound and another. The duration of a rest, like the duration of a note, is indicated by the form of the character representing it.

Semibreve.	Minim.	Crotchet.	Quaver.	Semiquaver.	Demi-semi-quaver.	Semi-demi-semiquaver.	Two Semibreves.	Four Semibreves.	Six Semibreves.	Eight Semibreves.

For rests of a still longer duration, it is now usual to draw one or two oblique lines across the staff, and write on them in figures the number of measures during which the voice or instrument is to be silent. Thus, 13 in common time, denotes a rest of 13 semibreves. A rest, like a note, may be prolonged by one or more dots.

REST-HARROW (*Ononis*), a genus of plants of the natural order *Leguminosæ*, suborder *Papilionaceæ*, having a 5-cleft bell-shaped calyx, the standard of the corolla large and striated, the keel beaked, the pod turgid and few-seeded. There are many species, chiefly natives of Europe, and generally herbaceous or half-shrubby.—The COMMON R. (*O. arvensis*) is abundant in pastures and by waysides in Britain. Its lower leaves have three leaflets, the upper are simple; the flowers are axillary and rose-coloured, or occasionally white. The plant is half-shrubby, with somewhat spiny stems; viscid; and its smell strong and unpleasant. The roots are tough and woody, whence its English name. It is sometimes a troublesome weed, but only in neglected pastures, and disappears before careful cultivation.

RESTIA'CEÆ, a natural order of endogenous plants, nearly allied to *Cyperaceæ*, mostly natives of the southern hemisphere, and abounding at the Cape of Good Hope and in Australia. They are herbaceous plants, or sometimes half-shrubby, have simple stems, and narrow leaves; and are hard, wiry, and rush-like. They have generally a creeping root-stock. The flowers are in heads or spikes, generally unisexual, with 2—6 glumes, sometimes with none, two or three stamens, an ovary with 1—3 cells, one ovule in each cell, the fruit a capsule or nut. *Restio tectorum* is much used for thatching houses at the Cape of Good Hope. *Wildenowia teres* is used for making baskets and brooms.

RESTIGOUCHE, a river in the north-west of the colony of New Brunswick, forms for about 50 miles the boundary between that colony and Canada East. It is 200 miles in length, and falls into Chaleur Bay, which opens into the Gulf of St Lawrence. For the last 18 miles it is navigable for the largest ships.

RESTITU'TION, in Scotch Law, is the obligation of the purchaser of a movable, which really belongs to a third party, to deliver it up to such real owner without claiming repayment of price. An action lies to recover restitution of money paid in mistake. See REPETITION.—In English Law, the word restitution is used in similar circumstances to denote delivery up of possession to the rightful owner. Thus, in case of goods stolen, the criminal court may order restitution of the goods to the owner.

RESTORA'TION, a term applied, in English history, to the resumption of monarchical government, on the accession of Charles II., May 29, 1660, after an interval of eleven years, from 30th January 1649, when Charles I. was beheaded, during which the government of Great Britain was republican. The Restoration was appointed by various statutes to be observed as a festival in the Church of England, with special religious services; but its observance was abolished in 1859 by act 22 Vict. c. 3.

RESTORA'TIONISTS, a sect which, under a new name, has revived a very ancient doctrine, which has found advocates at all times since the days of Origen (q. v.). One of the most remarkable doctrines of that Father was his belief of a general *apokatastasis*, or 'restoration' of all things, in which, after a purgation proportioned to the various moral conditions of their souls at the time of death, all men, however wicked, and all the evil angels, even Lucifer himself, would be restored to the favour of God, and reunited to Him in heaven. This doctrine was condemned at the time, and has since been repeatedly rejected by the churches of the East as well as of the West. The doctrine has been renewed in more than one form since the Reformation by various classes, who have taken the name of Universalists (q. v.). The particular title of R. was given in America to the followers of a preacher named Ballow, who, in addition to the tenet above explained, held that all retribution is confined to this life, and who, although he denied the immortality of the soul, yet taught that at the resurrection all men will be admitted to everlasting happiness. The R. are said to exist chiefly in Massachusetts.

RESURRE'CTION. This expression denotes the revival of the human body in a future state after it has been consigned to the grave. We find traces of this doctrine in other religions, and especially in later Judaism, but the doctrine is peculiarly Christian. In the earlier Hebrew Scriptures, there is no mention of it. It is not to be found in the Pentateuch, in the Psalms, nor even in the earlier prophecies. It is supposed to be alluded to in Isaiah (xxvi. 19), and in Ezekiel (xxxvii.) in the well-known chapter as to the revival of dry bones in the valley of vision; and in the last chapter of Daniel (xii. 2), there is the distinct affirmation that 'many that sleep in the dust of the earth shall awake, some to everlasting life, and some to shame and

everlasting contempt.' There is also a well-known passage in Job (xix. 25—27) which has been thought by some to refer to the doctrine of the resurrection of the body. Almost all recent criticism, however, denies the validity of this reference, as unsupported by a correct rendering of the words themselves; and especially by the whole scope of the argument of the book, which confines its view of retribution to the present life. The idea of a future resurrection would have presented to the mind of the patriarch a more conspicuous solution of the enigmas of Providence which perplexed him, and could not have failed to be introduced into the argument by some of the speakers, had it formed an element of their religious knowledge; but they nowhere allude to it. It is only, therefore, in the later Judaism that the doctrine appears. In the time of our Lord, it had become a formal doctrine of the Pharisees. The general body of the Jewish people seem also to have believed in it. The Sadducees alone disputed it (Matt. xxii. 23, sq.; Luke xx. 27, sq.; Acts xxiii. 6—8). It appears, in fact, to have become bound up in the Jewish mind with the idea of a future life, so that an argument which proved the one proved the other; and the Sadducees not merely denied the distinctive idea of the resurrection, but further denied that there was any 'angel or spirit.'

It remained for Christ and his apostles to reveal clearly the doctrine of the resurrection of the body, and to connect it with the fact of Christ's own resurrection as its special evidence and pledge. The following may be stated as the main points involved in the doctrine as revealed in the New Testament: 1. The resurrection of the dead is ascribed to Christ himself; it will complete his work of redemption for the human race (John v. 21; 1 Cor. xv. 22, sq.; 1 Thess. iv. 14; Rev. i. 18). 2. All the dead will be raised indiscriminately to receive judgment according to their works, 'they that have done good, unto the resurrection of life; and they that have done evil, unto the resurrection of damnation' (John v. 21—29; 1 Cor. xv. 22; Rev. xx. 11). 3. The resurrection will take place at 'the last day,' by which seems to be meant the close of the present world (John vi. 39, 40, xi. 24; 1 Thess. iv. 15). 4. The great event is represented as being ushered in by the sound of a trumpet, a representation probably borrowed from the Jewish practice of convening assemblies by sound of trumpet (1 Cor. xv. 52; 1 Thess. iv. 16). 5. As to the character of the change through which our bodies are raised after the lapse of ages, and get their identity preserved, there is nothing distinctly made known. The impossibility of such a change was evidently a subject of argument in the primitive Christian age, and the apostle argues strongly in its favour (1 Cor. xv. 32, sq.) from occurrences which are scarcely less mysterious in the natural world. It is not professed, however, that such occurrences really explain or throw light upon the fact of the resurrection. The apostle designs rather to silence cavils, and to invigorate faith, than to render an account of the actual manner of the resurrection. Arguing from God's infinite power as displayed in the processes of creation, he would, as it were, press the question which he asks elsewhere: 'Why should it be thought a thing incredible with you that God should raise the dead?' (Acts xxvi. 8), rather than attempt any explanation of which the subject does not really admit. And this is the only becoming spirit in which this great doctrine can be contemplated by any mind. The fact of a resurrection of the dead is clearly revealed; but the *mode* of the fact necessarily transcends our present intelligence.

RETAI'NER is, in English Law, the act of engaging an attorney or counsel to attend to a certain suit or case. The retainer of an attorney may be either verbal or in writing; but the retainer of a counsel is always by writing; i.e., by a written memorandum delivered by the attorney to the counsel. The retaining of a counsel is generally a precautionary measure resorted to only in the case of eminent counsel, the effect of it being to prevent the other party from securing the services of such counsel; and this is considered a prudent precaution in most cases of importance. The usual fee, however, must be paid over and above the retaining fee, which is a small fee varying with the court in which the litigation arises.

RETAI'NING WALLS. These, as their name implies, are walls built to retain earth, sand, or other incoherent substances in positions and forms which without their aid they could not maintain.

These substances, if left to themselves, will not stand with vertical sides, but will fall down till they assume a certain slope. The angle which this slope makes with the horizontal is called the 'angle of repose.' This angle varies according to the nature of the material; for example, that of moist soil is about 45°, while fine sand assumes an angle of about 30°.

In fig. 1, E represents a section of a mass of earth,

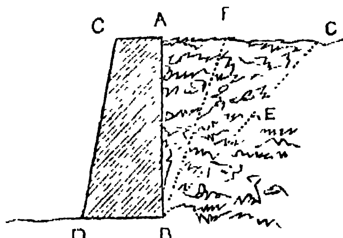


Fig. 1.

which it is desired to retain by means of the wall ABCD.

If we draw BG from B at the angle of repose, it is evident, from what has been said, that the prism ABG is kept in position by means of the retaining wall; and if the earth began to give way, it would do so by slipping on some line, BF. The wedge-shaped piece, ABF, which has the greatest tendency to separate itself from the rest of the mass, is called the 'prism of greatest pressure;' and the retaining wall ABCD must be made of sufficient weight and thickness to prop it up and resist its tendency to slide. The line BF is found to bisect the angle ABG.

In estimating the requisite thickness of the wall, it must be taken into account that the wall may give way in various manners; it may be overturned, or it may slide as a whole along its base DB, or the upper parts may give way, while the base remains.

From these data, mathematical formulæ have been worked out, which determine the thickness requisite for different situations and materials, such as that given by M. Poncelet for ordinary materials, and within ordinary limits:

$$x = \cdot 285(H + h).$$

Where H, the height of the wall, and h, the additional height of the bank above the top of the wall, being given, x, the thickness of the wall, can be found.

These formulæ, however, are not of much practical value, on account of the varying nature of the data on which they are founded, and of the excess of strength requisite in all such constructions, to

allow for causes of failure, which cannot be foreseen or provided for in the calculations. Practical experience is found to be the only safe guide in all such considerations.

Figs. 2, 3, and 4 represent sections of forms of retaining walls in common use. Figs. 2 and 3 are used in retaining earthworks, while fig. 4 is a common form of dock-wall.

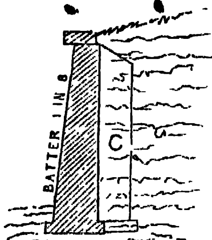


Fig. 2.

In that shewn by fig. 2, the thickness at the top is made from 2 to 3 feet; the back is vertical, and the front is sloped out 1 foot for every 8 feet in height; so that the thickness increases with the height, in the same manner as the pressure of the earth, which it is required to resist.

The foundation is made of large stones, extending beyond the sides of the wall, so as to distribute the pressure on as large a surface as possible. It is also sunk for 2 or 3 feet below the adjoining surface, so as to resist its tendency to slip on its base.

At its back are placed counterforts, C, which are built up with the wall, and are about 3 feet long by 2½ feet wide, placed from 8 to 10 feet apart. These counterforts stiffen the wall like ribs; they put its centre of gravity further back, and so resist the tendency to heeling or overturning; they also act advantageously in dividing the earth, and so diminishing the length of the mass, which can act together against the wall. This form of wall is very simple in construction.

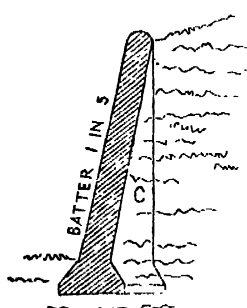


Fig. 3.

The form of wall shewn in fig. 3 is that which requires the least material; it also, on account of its thinness, dries and consolidates rapidly, but is not so easily built as that shewn in fig. 2.

The dock-wall shewn in fig. 4 is made much heavier than the simple pressure of the earth behind it would require; for it has many strains to bear of an exceptional character due to its situation; such are the machinery and goods deposited on the

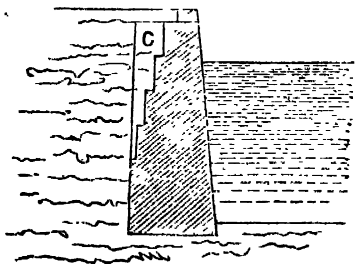


Fig. 4.

quays, and the possible accident of the dock being suddenly emptied of water, while the earth behind the wall is full of water.

In the construction of a retaining wall, a great desideratum is, that the earth behind it be well drained; for if water be allowed to accumulate behind the wall, the earth gets into a semi-fluid state, in which it gives a very much increased pressure on the wall. For this purpose, holes are left through the wall called 'weeping-holes;' these holes are about 9 inches high and 2 inches wide, and are generally placed about 1 for every 36 square feet of wall. Also stones without mortar are frequently built up behind the wall, so forming an open stratum, into which the water drains, and is thence carried off through the weeping-holes.

RETENTION OF URINE is the term employed in medicine to signify a want of power to discharge the urine from the bladder, and it must be carefully distinguished from a far more serious affection known as *suppression of urine*, in which also no urine is passed, because in this case there is none in the bladder.

Retention may arise either from change of structure of the parts concerned in the expulsion of the urine, or from mere disordered function unaccompanied by change. The former are termed *organic*, and the latter *functional* causes of retention.

Amongst the chief organic causes are: 1. Permanent stricture of the urethra (q. v.). 2. Contraction of the urethra, in consequence of a blow on the perinæum, or other external injury. 3. Tumours within the urethra. 4. Foreign bodies in the urethra, as calculi, clots of blood, or mucus, &c., which have entered it from the bladder, or fragments of bougies, &c., introduced from without. 5. Enlargement of the prostate gland, especially in aged men. The treatment in retention from these causes must be entirely left in the hands of the surgeon.

The principal functional causes are: 1. Spasm of the urethra, often termed spasmodic stricture; and 2. Want of power in the muscular coat of the bladder and urethra.

Spasm of the urethra is most likely to occur in those who have a slight permanent stricture, or a urethra irritable from other causes. The spasm usually follows exposure to cold and wet, but it may likewise be excited by piles or other sources of irritation in the lower bowel, or by the use of cantharides either taken internally as a medicine, or absorbed from blisters applied to the skin. The patient finds himself unable to pass his water, although he has a great desire and makes strong efforts to do so. The bladder soon becomes so distended that it can be felt as a tense round tumour above the pubes. If relief be not speedily afforded, the bladder may burst, and discharge its contents into the peritoneal cavity, in which case death rapidly ensues; or the urethra behind the stricture gives way, and the urine is extravasated into the cellular tissue of the adjacent parts—a condition which, if not promptly relieved by surgical interference, is likely to be followed by gangrene, typhoid symptoms, and death.

If the symptoms are not very severe, and there is no evidence of old permanent stricture, a hot bath, combined with the administration of the tincture of muriate of iron, in doses of ten minims, taken every ten minutes in thin gruel or in barley-water, will often give relief. Sometimes a full opiate administered by the mouth, or preferably as an enema, or the inhalation of a few whiffs of chloroform, will, by allaying the spasmodic action, give immediate relief. If these means fail, surgical assistance must be at once procured, and the bladder evacuated by a catheter—an operation often requiring very delicate manipulation. If these means fail, which only happens when the spasm is associated with old-standing disease of the urethra,

the surgeon must either puncture the bladder through the rectum, or above the pubes, or make an incision into the urethra either at or behind the seat of the stricture.

Paralysis of the muscular coat of the bladder may arise from the debility of old age, from the depressed state of the nervous system in fevers of the typhoid type, from injury or disease of the head or spine, and from various other causes. In a temporary form, it is often a result of over-distention of the bladder from stricture or prostatic disease, and it sometimes occurs in the case of nervous sedentary persons, if they have allowed rather more than the usual time to elapse without evacuating the bladder. It should be generally known that retention of urine from paralysis is sometimes accompanied with dribbling away of the water, so that the retention might at first sight be mistaken for *incontinence* of urine. On examination, however, it will be found that the bladder is abnormally distended, and cannot be evacuated by the act and will of the patient.

In these cases, the urine must for a time be regularly drawn away by the catheter. General tonics, such as the cold-bath (or sometimes preferably the sitz-bath) and chalybeates, must be given to improve the general health; while medicines which are supposed to act locally on the mucous coat of the bladder or on the spinal cord, must be simultaneously administered.

A peculiar form of retention sometimes occurs in women of hysterical temperament, in which the will rather than the power is at fault. The treatment should here be directed towards the general hysterical tendency, rather than to this special manifestation of it.

RE'TFORD, East, a small municipal and parliamentary borough and market-town in the county of Notts, on the right bank of the Idle, an affluent of the Trent, 138 miles north-north-west of London by the Great Northern Railway. West R., on the other side of the river, and connected with East R. by a strong bridge of five arches, is a more modern and much smaller town. Tanning and coachmaking are carried on to some extent. Pop. of municipal borough (1861), 2982; of parliamentary borough, which returns two members to parliament, and which includes several parishes and districts, 47,330.

RETHEL, a small town of France, in the department of Ardennes, prettily situated on the right bank of the Aisne. Woollen fabrics, flannels, merinos, &c., are extensively manufactured, and there are tanneries, breweries, and iron-foundries in operation. Pop. 6966.

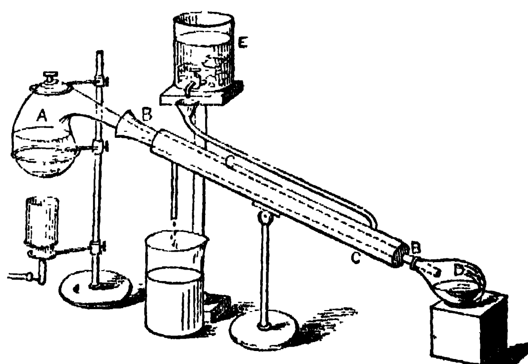
RE'TINA. See Eye.

RETI'REMENT, Army and Navy. In every service, to maintain a reasonably low age among the persons actively employed, it is essential that some scale should be fixed for retirement of old and worn-out officers and men; and it is the great bane of the British civil service that there is no fixed age at which Superannuation (q. v.) becomes compulsory. In the army, medical officers are allowed to retire after 25 years full-pay service; other officers after 30 years on full pay, or 25 years on half pay. In the navy, officers are placed on the retired list at 60 years of age, if they have not served in the rank they then hold. In most cases, in both services, the retiring officer is allowed a step of honorary rank; but this higher rank is purely honorary, and carries neither present nor prospective advantage in point of emoluments. In 1865, there were 1715 naval and 275 marine officers on the retired list, costing together for the year £368,255. In the army, there were 378 officers on retired full-pay, costing £112,500, and 2159 on half-pay, costing £324,360, besides 160 officers of foreign corps, £11,506; but these half-pay officers are not all retired, as in the number are included nearly all staff-officers, and those who are on temporary half-pay on account of sickness, private affairs, &c. The provisions for the retirement of common soldiers and sailors are stated under Pensions, Discharge, &c.

RETO'RT, a vessel employed by chemists for the purpose of distilling or effecting decomposition by the aid of heat. It may be made of glass, earthenware, or metal, according to the purposes for which it is to be employed.

Glass retorts are the most common, and their ordinary form is seen in the figure. They may be employed for the production of such products as do not require any extraordinary degree of cold for the condensation of their vapour—as, for instance, for the production of hydrocyanic or nitric acid. The globular vessel in which the neck of the retort is inserted is from its function termed *the receiver*. Cold may be applied to the neck of the retort—for the purpose of condensing the vapour—in various ways, as by the application of a cold wet cloth, by a current of water, or by a special apparatus known as *Liebig's Condenser*.

In the accompanying figure a *Liebig Condenser* is fitted on to the retort. A is the bulb of the retort, into which the matter to be distilled is inserted. It can be opened or closed at will at the top by a ground-glass stopper. From the bulb the neck proceeds, and its termination is seen in the receiver, D. The condenser, BB, embraces the greater part of the neck of the retort. It consists of a glass tube, tapering from end to end, fixed in the centre of a metal pipe, provided with tubes, so arranged that a current of cold water may circulate through the apparatus. By putting a few pieces of ice into the little cistern, E, the temperature of this water may be kept at 32° and extremely volatile liquids condensed.



Liebig's Condenser.

The retort may be heated in various ways—as by means of a lamp, or by placing its body in a sand-bath, or even in the fire; in the last case, the retort is usually protected by a coating of lute.

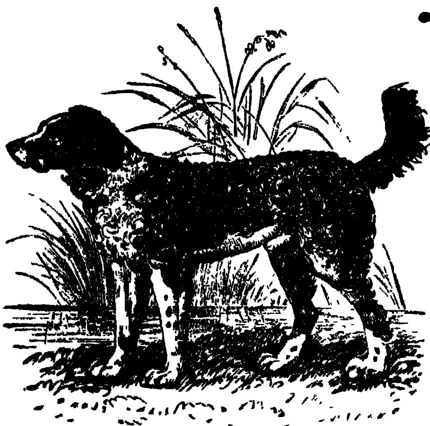
In ordinary cases requiring a higher temperature than glass could bear, earthen retorts are used; for the preparation of hydrofluoric acid, retorts of lead are employed; while for the preparation of strong sulphuric acid, platinum is the best material for the

retort. Iron retorts are employed in the laboratory for the preparation of oxygen from black oxide of manganese and some other processes; and in gas-works, for the destructive distillation of coal.

RETREA'T, in Military Language, signifies a retrograde movement of a force, with the intention of avoiding an encounter with a hostile body in the front. The greatest exertion of talent is requisite in a general to conduct an able retreat, more depending on arrangement and coolness than even in the preliminaries of a battle. When the enemy pursue, if the retreat is not to degenerate into a rout, the retreating army must be covered by a powerful rear-guard, which from time to time must hold the pursuers at bay, while the artillery-train and baggage pass defiles, cross streams, and overcome other special obstacles. A strong retreat is made when the rear is formed by a line of solid battalions, of which alternate masses retreat, while those intervening face about and oppose the enemy; the latter afterwards retreating between and to the rear of those which retreated in the first instance. The retreat is thus continued by alternate halting and falling back on the part of each corps.

RETRE'NCHMENT, in Fortification, is a defensive work, comprising at least ditch and parapet within some other work of a fortress, and intended as a place of retreat for the defenders, whence they may prolong the defence, or capitulate after the faces of the work itself have fallen into the enemy's hands. The retrenchment bears a considerable resemblance to the *réduit*, except that it is almost always of earth. Retrenchments are made in ravelins, and the re-entering *places d'armes* at the time of constructing those works. A retrenchment is thrown across the gorge of a redan or bastion, or from shoulder to shoulder, when it is apprehended that the salient angle will fall into the possession of the besiegers; these retrenchments are usually made when wanted. Such a retrenchment across the interior of the Redan at Sebastopol caused the sanguinary repulse of the British on the 8th September 1855.

RETRIE'VER, a dog specially trained to go in quest of game which a sportsman has shot, and particularly useful in fatiguing ground or in marshy

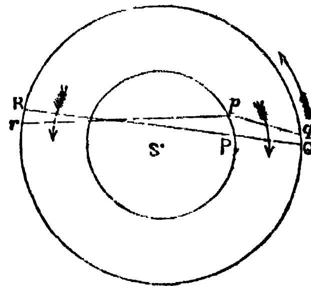


Retriever.

places. No particular breed is designated by this name, and retrievers are generally cross-bred, a large kind much in use being the progeny of the Newfoundland dog and the setter; a smaller kind, better suited for the pursuit of the smaller kinds of game, a cross between the spaniel and the terrier. Spaniels are also sometimes trained as retrievers. The training requires much assiduity and patience, the dog being apt at first to be drawn from the proper quest by any water-rat or other creature that presents itself, and also to bite the game too hard, so as to injure it. A thoroughly trained R. therefore commands a high price, being of great use to the sportsman. A high degree of intelligence is requisite in a R.; it is very often the attached companion of its master, and an inmate of the mansion rather than of the kennel.

RE'TROGRADE. This is a term applied to the motion of the planets and comets among the fixed stars, when they appear to move in the *reverse* order of the signs of the Zodiac (q. v.). All the planets move in the same direction round the sun, and therefore their retrograde motions must be due to their motion relative to the earth. In the case of comets, however, we have instances of motion about the sun in the opposite direction to that of the planets, and in such orbits the motion (referred now to the sun, not to the earth) is said to be retrograde.

In the case of the planets, which is thus the only one we need consider, let S be the sun, and let the two circles represent the orbits of two planets. First, let the planets be, as at P and Q, towards the



same side of the sun. The inferior planet has of course the greater velocity; and therefore, if p and q represent their positions after the lapse of a given time (second, hour, day, &c.), Pp is greater than Qq, and therefore the *direction* of the line pq (in which one is seen from the other) has rotated in the *opposite* direction to that in which either planet revolves about the sun. Hence, when a superior planet is in opposition (i. e., if Q be Jupiter, and P the earth), it *appears* to move backward among the stars. When an inferior planet is between the earth and sun (i. e., if Q be the earth, and P Venus), it *appears* to move backward also. If the planets be on opposite sides of the sun, as at P and R in the figure, let p and r be their positions after a given time; then pr has turned from the direction PR in the direction in which the planets revolve about the sun. Hence any planet, superior or inferior, appears to move *directly* when the sun is between it and the earth. Between these two opposite cases, there must, of course, be points at which the apparent motion is neither retrograde nor direct—then the planet is said to be *stationary*. This case occurs whenever, for an instant, the lines PQ and pq are parallel; that is, when the two planets are moving with equal velocities transverse to the line joining them, these velocities being parallel, and towards the same side of the joining line.

RETZSCH, FRIEDRICH AUGUST MORITZ, an eminent German painter and engraver, was born in Dresden, 9th December 1779, studied at the academy of his native city, where he became a professor in 1824. R. died 11th July 1857. He

has acquired great celebrity by his illustrations in outline of the great German poets, Schiller, Goethe, &c.—those of Goethe's *Faust* being particularly well known, not only in his own country, but also in France and England. His illustrations of Fouqué's charming romances, *Undine* and *Sintram*, are singularly beautiful. R. likewise executed several fine works, the subjects of which are taken from the classical mythology, as 'The Child Bacchus asleep on a Panther,' 'Diana,' 'Love and Psyche embracing in the Clouds,' 'A Satyr and Nymph,' 'The Four Epochs of Human Life;' &c. Among his other works of conspicuous merit are—'The Struggle of Light and Darkness,' 'The Chess-players,' and 'Fantasies.' R. ranks as one of the most original, thoughtful, and vigorous artists of modern Germany. His works display the presence of a strong, inventive, and cultured imagination, whose efforts at expression never degenerated into a weak sentimentalism. As a miniature oil-painter, R. was also very successful.

REUCHLIN, Johann, also known by his Græcised name of *Capnio*, one of the first and most active promoters of Hebrew studies in Germany, whose labours and struggles in no small degree helped to bring about the Reformation, was born at Pforzheim in Baden, 28th December 1455. He received his earliest education at Schlettstadt, and in 1473, was appointed travelling companion to Prince Friedrich of Baden, in which capacity he visited Paris, made the acquaintance of the celebrated Wessel (q. v.), and studied Greek under Hermonymus of Sparta, besides assiduously practising the composition of Latin. Two years later, R. went to Basel, where he continued his study of Greek, and wrote his Latin dictionary, *Vocabularius Latinus Breviloquus Dictus* (Basel, 1478). In the same year he paid a second visit to France, studied law at Orleans (1479), and fought at Poitiers (1480), then returned to Germany, married, and set up at Tübingen as a teacher of jurisprudence and literature. Subsequently, he was raised to the rank of a count of the German empire in 1492, and about the same time began the study of Hebrew under a learned Jew, Jacob Jehiel Loans, the imperial physician. In 1496, R. went to Heidelberg, where he wrote a satirical comedy entitled *Sergius, sine Capitis Caput*, directed against the unworthy Augustinian monk Holzinger, who had been made chancellor of Würtemberg. In 1498 he was sent to Rome by Philip the Elector-palatine, and delivered a Latin oration before the pope. While remaining there, he applied himself more vigorously than ever to the study of Hebrew and Greek, and with such success, that his Greek master, Argyropulus, exclaimed in wonderment at his proficiency: 'Our persecuted Greece has taken refuge beyond the Alps.' R. returned to Würtemberg in 1499. In 1506 appeared his *Rudimenta Linguæ Hebraicæ*, a work of which he was justly proud. He made it, as he said in his preface, 'without any foreign help,' declares it to be 'the first attempt to execute a grammar of the Hebrew tongue,' and finishes with the Horatian boast, *Exegi monumentum ære perennius*. His Hebraic studies, which embraced the post-biblical Jewish literature, were—in their consequences—the most important of his life, drawing him into bitter strife with learned Jews, Jewish proselytes, and the Dominicans, and directly and powerfully helping on the Reformation. It was in the year 1510 that the struggle between Light and Darkness, as the Germans regard it, broke out. In that year, Johann Pfefferkorn, a Jewish proselyte, in the true spirit of a renegade, called upon princes and subjects to persecute the religion of his fathers, and especially urged the emperor to burn or confiscate all Jewish books except the Bible. R. remonstrated, maintaining that no Jewish books should be destroyed except those directly written against Christianity. This tolerant attitude drew upon R. the enmity of the Dominicans, and particularly the inquisitor, Jakob van Hoogstraten. These enemies of R. held possession of the universities of Paris, Louvain, Erfurt, and Mainz; but all the distinguished and independent thinkers in Germany, were on the side of the brave and humane scholar. Among the *Reuchlinists*, as they were termed, we may especially mention the names of Ulrich von Hutten (q. v.) and Franz von Sickingen (q. v.), to the first of whom (in conjunction with Rubeanus, &c.) we owe the *Epistolæ Obscurorum Virorum* (q. v.), and to the second of whom R. owed his safety, for he threatened (1519) Hoogstraten and his monks with his most terrible vengeance if they did not cease to persecute 'his teacher, Doctor Reuchlin, that wise, experienced, pious, and ingenious man.' When the Reformation was inaugurated by the burning of the papal bull (1517), R. instinctively felt that a crisis had come, and exulted in the heroism of Luther. 'God be praised!' he said: 'we have now got a man who will give them [the monks] mighty hard work.' Luther, in a letter to R. (1518), tells the latter that he had longed to take part with him in his noble struggle, but had never found an opportunity. But the end of the scholar's troubles was not yet come. A quarrel broke out between Ulrich Duke of Würtemberg and the Swabian League, in the course of which R. became a prisoner of Duke Wilhelm of Bavaria, who, however, generously restored him his freedom, and in 1520, appointed him professor at the university of Ingolstadt. While here, he received a call to Würtemberg, which he declined, but sent Philip Melanchthon in his stead. In 1522 the plague broke out at Ingolstadt, and R. again withdrew to Tübingen, intending to devote himself exclusively to learned studies, but soon after he fell sick, and died at Stuttgart on the 30th of June. R.'s life has been written by Gehres (Karlsr. 1815) and Meyerhoff (Berl. 1830.)

RÉUNION, Ile de la, one of the names which has been borne by the island described under the head of Bourbon, Ile de. This last name it had borne till the French Revolution, when it was called *Réunion*; in 1809 it received the name of *Ile de Bonaparte*; after the treaty of Paris (1814), it reassumed the name of *Ile de Bourbon*, and retained it till 1848, when it again took the name of *Réunion*, and by that name it still (1865) continues to be officially known.

REUS, a lively, modern manufacturing town of Spain, in the modern province of Tarragona, and 10 miles west of the city of that name by railway. It is only about 5 miles from the seaport of Salou, with which it is connected by a canal. The older portion of R. was founded as early as 1151, and consists for the most part of tortuous lanes; the modern portion consists of wide plazas and streets. The *mercado*, a sort of arcaded exchange, surrounded with shops, is the principal square. The prosperity of R. dates from about the year 1750, when a number of English merchants settled there, and developed the resources of the district. A number of the inhabitants are engaged in agriculture, but the majority are employed in the manufacture of silk and cotton fabrics, soap, earthenware, casks, leather, machinery, and in the general trade of the town. R. contains 80 establishments for cotton-spinning alone, 5000 looms, and many silk-ribbon factories. It imports flour, sheep and cattle, timber and hides, and

exports brandy, wines, nuts, almonds, oil, leather, &c. Pop. 28,100.

REUSS, the name of two sovereign principalities of Germany, between the kingdom of Saxony and the Prussian duchy of that name, and separated from each other by the circle of Neustadt, an outlying portion of the grand-duchy of Saxe-Weimar. Since the year 1616, the possessions of the House of R. have been divided between the elder and the younger lines. The united area of the possessions is, according to the *Almanach de Gotha* for 1865, 458 sq. m., pop. (1862) 125,490. The principality of R.-Greiz, that of the elder line of the House of R., is 143 sq. m. in extent, and had in 1862, 42,130 inhabitants. The chief town and seat of the government is Greiz (q. v.). The principality of the younger line is R.-Schleiz, area 315 sq. m.; pop. (1862) 83,360. Chief town Schleiz (q. v.). Of both principalities, the surface is hilly, being traversed by the Frankenwald, whose chief summits are upwards of 2000 feet in height. The chief rivers are the Saale and the Elster, the valleys of which are extensive and well cultivated. Large tracts are covered with forests and in pasture, and cattle and timber are exported. For both lines, there is a kind of senate for the superintendence of common interests. The two lines have, in conjunction with several other small states, the sixteenth vote in the limited councils of the German diet, but in the *Plenum*, the lines have each a vote. The entire federal contingent of the principalities of R. amounts, according to the latest accounts, to 1241 men, of which R.-Greiz contributes 371, and R.-Schleiz 870 men.

REUTLINGEN, a town of Würtemberg, situated in a beautiful district, fertile in fruit and wine, on the Echatz, a feeder of the Neckar, 20 miles south of Stuttgart. Its houses are old and picturesque; and it was formerly surrounded by walls and moats, the site of which, however, is now occupied by streets. The church of St Mary, completed in 1345, and surmounted by a pierced tower 325 feet high, which is considered the most beautiful in the kingdom, is a noble Gothic edifice. Woollen and cotton yarns are spun, and cloth, leather, cutlery, hosiery, &c., are manufactured. Pop. (1861) 13,449.

REVALE'NTA ARA'BICA, a name given to a preparation which has long been sold as an empirical diet for invalids, extraordinary restorative virtues being attributed to it. It is, in reality, only a preparation of the common lentil, its first name being formed for disguise by the transposition of its botanical name, *Ervum Lens*. Its real value is about equal to good peameal, the constituents of 100 parts of each being as follow: *Lentil Meal*, or *Revalenta*—Water, 12·70; nitrogenous matter, 24·57; starch, 59·43; fatty matter, 1·01; inorganic matter, 2·29. *Peameal* -Water, 12·60; nitrogenous matter, 25·30; starch, 58·38; fatty matter, 1·20; inorganic matter, 2·52.

REVEA'L, REVEL, the square ingoing of the sides and lintel, or arch, of doors and windows between the face of the wall and the framing.

REVEILLÉ, in an Army, is the beat of drums at break of day, to warn the troops that the night is past, and the sentries to forbear from challenging.

RE'VEL, a Russian seaport and fortress of the first rank, capital of Esthonia, one of the Baltic provinces, stands on a small bay of the same name, 238 miles west-south-west of St Petersburg. It is divided into the upper and lower towns. The former, occupying the top of a rocky ridge about a mile in circumference, is enclosed by old Gothic walls, and contains the cathedral, the castle, gymnasium, governor's residence, and the houses of the nobility. This quarter, generally called the Dom, is connected by a steep descent with the lower town, which extends to the sandy shore of the harbour. The existing walls and fortifications were erected in 1360. It was long held by the Lithuanian Order of Knights; was made over to Sweden in 1562; bombarded by the Danish and Lübeck fleets in 1569; and besieged by Peter the Great, and annexed to the Russian empire in 1710. In 1713, a naval harbour, in addition to the commercial harbour already existing, was founded. The commercial importance of the town is at present small. The chief articles of export are flax, linseed, rye, skins, corn, and potato-brandy,' which are supplied by land from the governments of Esthonia, Pskov, and Livonia. The chief imports are salt, fruits, wine, and manufactured and colonial goods. Pop. 25,120.

REVELATION is a familiar theological expression, commonly applied to the knowledge of Himself which God has given us in Holy Scripture. In itself, however, the word is properly, and of late years has been frequently used, not merely of the divine knowledge communicated to us in Scripture, but of all divine knowledge communicated through whatever source. Conscience and reason are in themselves modes of revelation, in so far as they witness to us of the divine laws which bind our moral life, and in harmony with which the health and happiness of that life can alone be found. History is also a species of revelation, unfolding, as it does, the same divine laws collectively in the race. Then nature reveals the divine power, wisdom, and goodness; and science, the interpreter of nature, in so far as it makes known the great laws governing the material universe, truly makes known the divine will to us. But it is with the Scriptures of the Old and New Testament that the idea of revelation has come to be especially associated. The Holy Scriptures are undoubtedly in a special sense the medium of divine revelation to the human race. God has made known to us therein more fully and clearly than elsewhere His will and character. But at the same time we must not confound revelation, in its fact and essence, with the books of Scripture. These books are only the highest or most distinguished form or *medium* of revelation, which, in itself, and essentially, must always imply communication from one mind to another; and, in a religious sense, from the divine to the human mind. Scripture is, in its several books, the pre-eminent medium of this contact or interchange of the divine and human. It is the record of special communications which God made in time past to holy men, 'who spake as they were moved by the Holy Spirit.' It *contains*, in short, a revelation for us; but the revelation is not the record, but the knowledge which the record conveys to our minds.

REVELATION OF ST JOHN (*Apokálypsis Iōannou*), the last book of the New Testament Scriptures. It professes to be the production of St John, traditionally known as 'The Divine' (*ho theológos*). It has been a subject of dispute, however, whether St John, the author of this book, is the beloved apostle, the author of the fourth gospel and of the three Epistles, or not. Upon the whole, the balance of evidence and of authority seem to be in favour of the supposition that he is the same, although some distinguished names—Luther in the past, and Lücke among modern critics—have adopted the negative view of the question. The author's simple mention of himself by his name John; his description of himself as one 'who bare record of the word of God, and of the testimony of Jesus Christ, and of all things that he saw,' is held

to indicate strongly an identity with the author of the gospel, who speaks of himself in similar language (John xix. 35). He writes from Patmos, and the apostle is the only John distinctly named in the early Christian history as an exile in Patmos. The authority, moreover, with which the writer addresses the seven churches in Asia is such as may be supposed only to suit an apostle. So far as historical testimony is concerned, the authority of the early Christian Fathers—e. g., Justin Martyr, Theophilus of Antioch, and Irenæus, and Clement of Alexandria—all point to the Apostle John as the author of the Book of Revelation. The date of the book is supposed to be the very close of the 1st c. 95—97 A. D., or the end of the reign of Domitian. We cannot here particularise the contents of the book, nor can we enter into any detailed statement of the different interpretations which have been given of it. It has been the subject of very varied and conflicting commentary. It has been stated that 'not less than 80 systematic commentaries are worthy of note, and that the less valuable writings on the subject are unnumbered, if not innumerable.' All that we can do here is to characterise the different schools, so to speak, into which the interpreters of this wonderful book may be arranged: 1. The Præterist School of interpreters, who look upon the Revelation as fulfilled in the past, and especially in the great conflicts of Christianity with Judaism and Paganism, and its triumph over them in the ages following the time in which it was written. To this class of interpreters belong, among others, Grotius, Hammond, Bossuet, Calmet, Eichhorn, Ewald, Lücke, De Wette, Stuart, Lee, Maurice. 2. The *Futurist* School regard the book, with the exception of the first three chapters, as referring to events yet to come to pass; and this view has been advocated, in modern times, by such writers as Dr J. H. Todd, Dr S. R. Maitland, Newton, and others. 3. What has been called the Historical and Continuous School of expositors, who regard the Revelation as a progressive symbolic history of the fortunes of the church from the 1st c. to the end of time. To this school of interpreters belong a host of eminent names, such as Mede, Sir I. Newton, Vitringa, Bengel, Faber, Elliot, Wordsworth, Alford, Hengstenberg, Ebrard, and others.

There are others, again, who are not disposed to allow any exact prophetical character to the book, but simply to regard it as a species of symbolical poem, setting forth the eternally-recurring principles of the divine government. The real fulfilment of the Revelation, therefore, is not to be sought in any definite historical events, but in the vindication of these principles shadowed forth more or less in great historical crises, yet transcending all partial historical results. The grand symbolic imagery of the book has never found and will never find its exact counterpart in any earthly facts, but it finds its spiritual counterpart constantly in the career of the church—the unceasing conflict of truth with error, of righteousness with sin, of life with death, of the kingdom of God with the kingdom of evil, and will attain to its true realisation only on the destined triumph of the former over the latter.

REVELS, Master of the, or **LORD OF MISRULE**, the name of an officer, who, in England, was attached to royal and other distinguished houses, whose function it was to preside over the amusements of the court, or of the nobleman to whose house he was attached, during the 12 Christmas holidays. This officer, sometimes called *Master of the Tents and Revels*, became a permanent appendage to the English court in the reign of Henry VIII., and his duties included the keeping the tents and pavilions which accompanied the sovereign on a royal progress, as also the keeping the dresses and masks used in entertainments given at court, and the providing of new ones when required. In Queen Elizabeth's time, we find the Mastership of the Revels divided into several distinct offices. The office continued to exist till the reign of George III., when it was altogether discontinued.

REVENUE, Public. A state has a right to reserve part of the property of the citizens, or of the produce of the country, or to exact contributions from the citizens, to supply the expense of carrying on the government. It is also entitled to augment the riches of the state by taxing merchandise imported into or exported from the country, and by taking a small part of the things consumed. In the United Kingdom, this branch of the sovereign power is vested in parliament.

The revenue of the crown, in England, has been divided by Blackstone into two branches, designated ordinary and extraordinary; the former attached to the crown by hereditary right, the latter specially granted by parliament as a supply for national purposes. The so-called ordinary revenue was the more important of the two, in the early history of the country, consisting in a great measure of the rents of the crown-lands; but these came, in the course of time, to be dilapidated by alienation and improvident management; and what remains of the hereditary land and forestal revenue of the crown, is now intrusted to certain officers, called Commissioners of Woods, Forests, and Land Revenues (see Woods and Forests), who act under the control of the Treasury. From the diminution of the hereditary revenues of the crown, subsidies have become the chief source of supply, a circumstance constitutionally of great importance, as it has rendered the crown dependent on parliament for its ordinary support and existence.

The popular voice, in the matter of taxation, was admitted as early as the reign of Edward I., an act of that monarch declaring 'that no tallage or aid shall be taken or levied without the goodwill and assent of the archbishops, bishops, earls, barons, knights, burgesses, and other freemen of the land.' The laity were thenceforth taxed by the votes of their representatives. The lords spiritual and temporal voted separate supplies for themselves; and from the reign of Edward I., the clergy, as a body, granted subsidies, either as a national council of the clergy, in connection with parliament, or, at a later period, in convocation, till the disuse of this right in the reign of Charles I. As the Commons increased in political importance, the subsidies voted by them became the principal sources of revenue, and they gradually assumed their present position in regard to taxation and supply, including the lords as well as themselves in their grants. Concurrently with parliamentary taxation, imposts were formerly levied by royal prerogative alone; but none of these survived the Revolution of 1688. A grant by the Commons is not effectual without the ultimate assent of the Queen and House of Lords; the Lords, however, cannot alter a bill of supply, though they may refuse their assent to it.

The royal speech at the opening of parliament requires the Commons to make provision for the public service, and states that estimates will be laid before them. The Commons, referring to the royal speech, resolve that a supply be granted. Sitting as a Committee of Supply, they consider what specific grants shall be voted; and sitting as a Committee of Ways and Means, they deliberate on the manner in which the necessary funds shall be raised. When some progress has been made in voting the estimates, the Chancellor of the

Exchequer brings forward, in the Committee of Ways and Means, his annual statement, popularly known as the Budget, embodying his views on the probable revenue and expenditure of the year, which forms the groundwork of bills for imposing new taxes, or repealing, reducing, or continuing those that already exist. Apart from the services voted in detail by the Committee of Supply, there are some few permanent charges which the Treasury is bound to defray from the Consolidated Fund, such as the interest of the national debt, the civil list, the annuities of the royal family, and the salaries and pensions of judges and some other public officers. When taxes are imposed or altered, the government begins to levy the new duties as soon as the resolutions for that purpose are agreed to by the House. A control is established over the expenditure of the supplies by the long-established practice of separating the custody of the public revenue from the function of payment, the former being vested in the Exchequer, and the latter in the Treasury, and the officers of the Exchequer being empowered to refuse their sanction to any demand not in accordance with the determination of the legislature. By an arrangement effected by 4 and 5 Will. IV. c. 15, the public revenue is now paid into the Bank of England, to the credit of the Comptroller-general of the Exchequer, an officer independent of the ministry, who can only be removed on a joint-address to the crown from both Houses of Parliament.

The principal sources of revenue are now the customs, the excise, the stamp duties, the land-tax and assessed taxes, the property and income tax, the post-office, and the crown lands. The excise, stamps, and taxes have been placed, by 12 Vict. c. 1, under the control of a Board, called the 'Commissioners of Inland Revenue.' The aggregate of the different sources of revenue is paid into a fund called the 'Consolidated Fund,' founded by 27 Geo. III. c. 47, which is chargeable with the interest of the national debt, and is mortgaged to raise an annual sum for the maintenance of the royal household and Civil List (q. v.).

The following table exhibits the gross revenue and expenditure of the United Kingdom, in the year ending March 31, 1864:

REVENUE.

Customs,	£23,2[illegible]2,000
Excise,	18,207,000
Stamps,	9,317,000
Land and Assessed Taxes,	3,218,000
Property Tax,	9,081,000
Post-office,	3,816,000
Crown Lands,	305,000
Miscellaneous,	3,035,963
Total revenue,	£70,208,963

EXPENDITURE.

Public Debt,	£26,211,790
Civil List,	405,843
Diplomatic Service,	169,777
Courts of Justice,	685,331
Navy,	10,821,596
Army,	14,638,051
Annuities and Pensions,	312,066
Civil Services, &c.,	8,101,785
Salaries, &c., of Revenue Departments,	4,527,432
Packet Service,	922,082
Sundries,	260,523
Fortifications,	800,000
Total expenditure,	£67,856,286
Excess of Income over Expenditure,	2,352,677

It appears, from a return moved for in the session of parliament 1863, that, in 1801, the gross revenue collected in Great Britain, excluding miscellaneous receipts, amounted to £35,218,525, and in Ireland, to £2,919,217. In the financial year 1861—1862, the amount was £61,360,749 received of Great Britain, and £6,792,606 of Ireland. It follows that, in 1801, the gross revenue received in Great Britain amounted to £3, 7*s.* per head of population, and in Ireland, 11*s.* 2*d.*; while in 1861—1862, the amount per head was £2, 13*s.* in Great Britain, and £1, 3*s.* 5*d.* in Ireland. At the Conquest, the public revenue of England is estimated to have been about £400,000; and in the reign of Henry VI., it had fallen to £65,000. Under Henry VIII., it rose to £800,000; and under Anne, at the union with Scotland, it was £5,700,000.

The gross revenue of British India, for the year ending April 30, 1864, was estimated at £44,753,500, the expenditure at £44,4[illegible],611; leaving an excess of £257,889 of income over expenditure. The present estimated revenue of France is about £84,000,000; of Russia, £57,000,000; of Austria, £45,000,000; of the kingdom of Italy, £27,000,000; of Prussia, £20,000,000; and of Spain, £20,000,000.

REVE'RBERATORY FURNACE, a furnace so constructed that matter may be heated in it without coming in direct contact with the fuel. It consists essentially of three parts—viz., a fireplace at one end; in the middle, a flat bed or sole, on which the material to be heated is placed; and at the other end, a chimney to carry off the smoke or fume. Between the fireplace and the bed, a low partition-wall, called a fire-bridge, is placed, and the whole built over with a flat arch, dipping towards the chimney. The flame plays over the fire-bridge, and is reflected, or *reverberated*, on the material beneath, hence the name. See LEAD (figs.).

RE'VEREND (Lat. *reverendus*, to be respected), a title of respect given to the clergy. In Roman Catholic countries, it is applied to the members of the different religious orders. In France, before the Revolution, archbishops, bishops, and abbots were alike 'Most Reverend.' In England, deans are 'Very Reverend;' bishops, 'Right Reverend;' and archbishops, 'Most Reverend.' In Scotland, the clergy in general are 'Reverend,' while it is the practice to apply 'Very Reverend' to the moderator of the General Assembly for the time being, to a synod, and to the principal of a university, being a clergyman. The General Assembly itself is usually styled 'Venerable,' but the address of the Lord High Commissioner begins with the words: 'Right Reverend and Right Honourable.'

The style Reverend is generally adopted by, and given to, the clergy of the different dissenting bodies; but there have been instances in which some of them have repudiated it.

RE'VERIE has been defined the dream of a waking man; it differs, however, in many respects; from dreaming. In an exaggerated form, it is of rare occurrence; but when exceeding absence of mind, or abstraction from what is passing around, it is abnormal and unhealthy; and may, under all circumstances, be regarded as a phenomenon of an imperfectly constituted, if not of a diseased nervous temperament. It is, moreover, generally, and always at its commencement, under the control of the will. Reverie is apparently, in all cases, an exaltation of the faculty of attention: the mind may be occupied according to the age, character, pursuits of the individual, by calculations, profound metaphysical inquiries, by fanciful visions, or by such trivial and transitory objects as to make no impression upon consciousness, so that the period of reverie is left an entire blank in memory. The most obvious external feature marking this condition is the apparent unconsciousness, or partial perception, of external objects. In what may be designated the first stage, castle-building, this inattention is only apparent, as

the surrounding scenery may enter into the illusion, and constitute a part of the romance. In the celebrated case of Hartley Coleridge, whose double life, indulged in for years, affords illustrations of voluntary creations ultimately extorting a degree of belief and expectation—from a field near his home burst forth a cataract, from which flowed a river; on the banks of this arranged themselves fertile fields, a populous region, divided into realms and kingdoms, governed by laws, having traditions, histories. 'Ejuxria' was, in fact, an analagon to the world of fact, embellished by imagination. This cherished unreality was parted with reluctantly. A more advanced stage of the affection is where, independently of the will, and in opposition to the ordinary habits of the individual, and under peculiar circumstances, there occur a loss of cognizance of surrounding objects and relations, and a state of abstraction or brown-study, in which many absurd and incongruous things are said and done. Ludicrous examples of this state are witnessed where a man loses his way in his native town, forgets his own name, or retires to bed in the middle of the day. It is related that Sir Robert Peel, utterly unobservant of the adjournment of the House of Commons, and the departure of the members, remained on one occasion unmoved in his seat, plunged in a profound reverie, until the lights were about to be extinguished, and he was roused by the clerk of the House. In a third stage or form, the reverist cannot be recalled to active perception, loses individuality, and is absorbed in the contemplation of unreal, though self-suggested impressions. This is seen in such cases as St Teresa, and in the trances of Mysticism, Quietism, Second Sight.—*Memoir of Hartley Coleridge*, Disraeli's *Life of Lord G. Bentinck*, Maury's *Le Sommeil et les Rêves*.

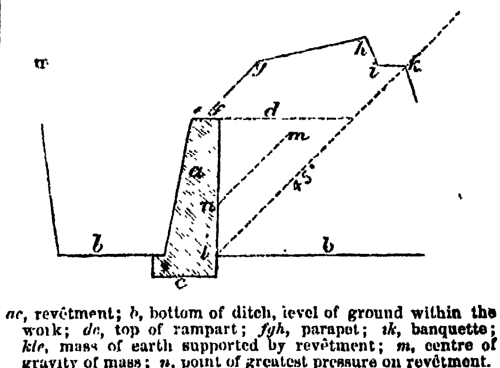
REVERSE, in Numismatics, the side of a coin or medal which does not bear the principal device or inscription. There is, however, generally an inscription or device on the reverse; and when the lower part of it is markedly separated from the rest, it is called the EXERGUE (Gr. *ex ergou*, without the work), and bears a secondary inscription.

REVERSED, in Heraldry. A term applied to a charge turned upside down.

REVERSION. When the enjoyment of money, or of any kind of property, is postponed until, or contingent on, the happening of a given event or given events, the present right to the deferred benefit is called a reversion. When the emergence of the right is certain, and the date fixed, to ascertain the immediate or marketable value of a reversion, is a very simple calculation; for example, let it be required to know for what sum a man should sell the right to receive £100 payable ten years hence. Suppose that he expects to be able to improve the money for which he sells his right at five per cent. per annum, compound interest, then one obvious way to get an answer to the question is simply to calculate what sum annually accumulated at the assumed rate will in ten years amount to £100. The answer (see art. INTEREST) will be found to be £61, 7*s.* 10*d.* When the date of the emergence of the reversionary right is uncertain, the purchase, in an individual case, must always be a speculation; but if there are a sufficient number of such rights, postponed to events of which there are sufficient observations from which to deduce laws of average, then the marketable value is easily calculated. For example, it is required to know what is the immediate value of £100 payable certainly on the death of a man aged 60. Here the perpetuity divides itself into the present value of an annuity of the annual interest of the £100 on the life of a male aged 60, and the reversionary right which is to emerge when the life fails. Having then ascertained the former value, and deducted it from £100, the remainder will be the present value of the reversion. When an assurance company buys a reversion, it is simply buying that which it sells when it grants a policy of life assurance. In the former case, however, an office, to secure its expenses and profits, will assume a high rate of interest and a long life; in the latter case, for the same reason, it will assume a low rate and a short life. Where the reversion is contingent, problems arise whose solution requires the utmost skill on the part of the actuary; for instance, B, aged 30, wishes to borrow £100 on the security of a sum payable to him *in the event* of his surviving A, aged 58. Here the security being doubtful, it could only be rendered marketable by assuring a sum to be paid in the event of B dying before A; and there would remain the important question of what this sum should be, so as to cover the loan and the premiums of assurance with yearly accumulations on both. This question will be found ably discussed in a paper by Mr Lang in the *Assurance Magazine* for 1850, p. 18.—On the general subject, see the same work for 1851, paper by C. Jellicoe, Esq.; do. for 1855, p. 239, paper by Robert Tucker, Esq.

REVERSION is that right to property which remains after some particular estate has ceased which had been granted by the owner. Thus, if A has a life estate in B's property, and after he dies, the property returns to B, B is said to have the reversion, or to be the reversioner. The landlord of property let to a tenant is called the reversioner, because, the moment the lease determines, the whole of the property and possessions vest in him. In the sale of reversionary estates, owing to the want of a system of registration of deeds, great risk is incurred by the purchaser lest the property should be burdened by some rent-charge.

REVÊTMENT, in permanent Fortification, is a retaining-wall of masonry built for the purpose of holding back the earth of which works are composed. The most ordinary position of revêtments



ac, revêtment; *b*, bottom of ditch, level of ground within the work; *de*, top of rampart; *fgh*, parapet; *ik*, banquette; *kle*, mass of earth supported by revêtment; *m*, centre of gravity of mass; *n*, point of greatest pressure on revêtment.

is for the escarp and counterscarp of the ditch (see FORTIFICATION). The most important of these two is the escarp, which has to hold back the great mass of earth represented by the rampart, parapet, banquette, &c. It is usually of solid brickwork or stone, 5 feet thick at the top, and sloping outwards as it descends (on the ditch-side only) to the extent of 1 in 6. Prior to Vauban's time, the escarp revêtment was commonly raised to the top of the parapet; but as in this case the artillery of a besieger played on the top of the wall, and ruined it soon after the siege commenced, that engineer

adopted the principle—thenceforth followed—of raising it no higher than the crest of the glacis, or about 7 feet above the natural ground, leaving the parapet above of sloped earth only When the main ditch is 24 feet deep, the scarp revêtment will be about 30 feet high Additional strength is imparted to the revêtment wall by massive buttresses at every 15 feet, called *counterforts*, and these, again, are sometimes connected and strengthened by masonry arches outside the revêtment The revêtment forms a terrible barrier to an assaulting party In field works, temporary revêtments may be made of timber, turf, hurdles, or any other materials at hand

REVIEW, in Military parlance is the inspection by the sovereign or some staff officer of any body of troops in parade order Reviews always comprise a march past the inspecting officer in column and a general salute in line, to these is frequently added a mock battle for the amusement of spectators, and the practice of the troops themselves in warlike manœuvres

REVIEW The name applied by contemporary usage to such periodical publications as are made up of critical essays See P[illegible]

REVISING BARRISTER [illegible] appointed [illegible] the persons entitled to vote [illegible] For this purpose all England is subdivided into districts, and a barrister is appointed for each district by the judges of assize Though the appointment is only for one year, yet practically the [illegible] appointed for life The barrister must be of three years standing at least [illegible] place generally between August and October [illegible] year There is an appeal from the decision of the revising barrister to the Court of Common Pleas at Westminster Similar duties [illegible] in Scotland by the sheriff [illegible]

REVIVOR is a bill or writ by which [illegible] action is kept alive in the English courts of equity or law where one of the parties dies [illegible] dependence

REVOCATION [illegible] the withdrawing or annulling [illegible] deed or will which otherwise would be valid A will is said to be always subject to revocation [illegible] the testator [illegible] not to be irrevocable because a will is supposed to be subject to the ever varying [illegible] On the other hand, a deed is not capable of revocation, and is in its nature final and irrevocable but if an express proviso is inserted which reserves a power of revocation, then this is valid [illegible] exercised, provided the directions [illegible] strictly followed.

REVOLUTION, in Politics, any extensive change in the constitution of a country suddenly brought about. The two most important events in modern history known under this name are the English Revolution of the 17th c and the French Revolution of the 18th The former began in the early part of the reign of Charles I, with the struggle between that king and his parliament In 1642, the struggle became a civil war, in which the parliament obtained the ascendency and brought Charles to the block in 1649 A republic followed, under the Protectorate of Oliver Cromwell, which was succeeded in 1660 by the Restoration of monarchy in the person of Charles II, but the arbitrary rule of James II brought the king and people again into antagonism; and James having fled the country, William III was called to the throne under such conditions and safeguards as secured the balance of the constitution—The French Revolution was a violent reaction against that absolutism which had come in the course of time to supplant the old feudal institutions of the country. It began with an outbreak of insurrectionary movements at Paris in July 1789, including the destruction of the Bastille On the 21st January 1793, King Louis XVI was beheaded The Christian religion was deposed [illegible] of the Republic and worship [illegible] and a disastrous reign of blood and terror followed, which was brought to an end in 1794 when Robespierre himself suffered on the guillotine the fate to which he had condemned countless multitudes of his countrymen

Among other important revolutions in the modern world are the American Revolution of 1775, by which the United States threw off their dependence on Great Britain, the French Revolution of 1830, which drove Charles X into exile, and raised Louis Philippe, Duke of Orleans, to the throne by the will of the people as also the Revolution of 1848, when France rose against Louis Philippe, and adopted [illegible] a republican form of government, the revolutionary contagion spreading temporarily over most of continental Europe By the Italian Revolution of 1859–1860, the various minor sovereigns of Italy were driven into exile, and the whole of the peninsula, with the exception of the Roman and Venetian territory, became subject to the constitutional sway of Victor Emmanuel, formerly king of Sardinia, and now of Italy.

REVOLUTIONARY TRIBUNAL, the name specially given to the infamous court of judgment—the most extreme [illegible] will scarcely affirm that it was a court of justice—instituted by the [illegible] Convention in March 1793 on a motion made by Danton [illegible] who considered that such a court [illegible] [illegible] the recent [illegible] the national armies on the frontier [illegible] dangerous conspiracies against the [illegible] government Its members were chosen from the various departments, and their appointment [illegible] by the Convention Then [illegible] on all persons [illegible] the state [illegible] their [illegible] appalling promptitude, the [illegible] Reign of Terror,' [illegible] public accuser,' [illegible] abolishing soon [illegible] hearing witnesses [illegible] allowing him an [illegible] blindly executing the [illegible] of Public Safety,' which [illegible] the hands of Robespierre (q. v.). [illegible] tribunals, under the name of 'Revolutionary Committees' were established, the [illegible] of which, is, for instance, Carrier (q. v.), shot or drowned *en masse* in crowds

REVOLVER, in Firearms, is a weapon which, by means of a revolving breech or revolving barrels, can be made to fire more than once without reloading The invention is very far from new, specimens, with even the present system of rotation, being still in existence, which were manufactured at the beginning of the 17th century Probably the first revolver to suggest itself was one in which several barrels were mounted on an axis, and made to revolve by the action of the trigger, so that their powder pans came successively under the action of the lock This principle was never entirely abandoned, and in the reign of George IV was produced a pistol called the 'Mariette,' which had from four to twenty four small barrels bored in a solid mass of metal, made to revolve as the trigger

was drawn back. At close quarters, such a pistol would doubtless have been useful; but its great weight and cumbrous mechanism rendered aim extremely unsteady.

Contemporaneously from the first with the revolving barrels, went the formation of a revolving chamber or breech, pierced with several cylindrical apertures to receive the charges. Being made to revolve, each motion brought a chamber into line with the one barrel, common to all, whereupon the weapon was ready for use. Numerous patents for this principle have been taken out, including one by the celebrated Marquis of Worcester in 1661. Various improvements were made, especially in the mode of causing revolution, an American, of the name of Elisha H. Collier, patenting such a weapon in the United States and England about 1818. In 1835, Colonel Samuel Colt brought to a conclusion experiments of some years standing, and patented his world-renowned Colt's Revolver, which was a great advance on all previous attempts, and is sub-

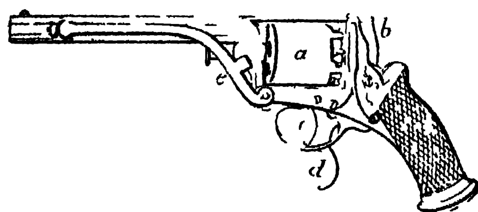


Fig. 1.

a, the chamber; b, hammer; c, trigger; d, ... for raising the hammer; e, ...

stantially still in use. Colt's revolver consists of one rifled barrel of considerable strength, and a massive chamber perforated with six or seven barrels, which are brought into a line with the barrel by action of the trigger. Each chamber has its nipple for a cap, which is brought under the hammer by the motion which brings the chamber or breech-piece round. The hammer is discharged by the trigger, and acts nearly horizontally in a forward direction. Under the pistol is a fixed lever-ramrod, which is used in loading the chambers. This mechanism enables a combatant to be on a tolerably fair footing with a party who have the command of six single-barrel guns. Besides all this, by withdrawing a bolt, which can be done in a moment, the entire breech-piece can be taken out, and replaced by another ready charged, so that, by carrying a spare breech-piece, a person may fire twelve shots in less time than another could fire three if he had to load between the shots. Colt's revolvers are now extensively used in the naval and military services of America and Europe.

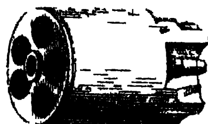


Fig. 2.—Chamber with five barrels.

The principal rival of Colt's Revolver has been the Deane and Adams' Revolver, although many more of various sorts have been patented in the interval. The 'Deane' differed in that it could be fired by merely pulling the trigger without also raising the hammer with the finger, as in Colt's; but this was found to be so dangerous in practice, that the inventors soon substituted an arrangement under which it could be fired either by the trigger or by raising the hammer; and lastly, they introduced the great improvement of a spur behind the trigger, which must be pressed by the middle finger, while the forefinger discharges the piece through the trigger. On the whole, it is difficult to say whether Colonel Colt's or Messrs Deane and Adams' is in the greatest favour with connoisseurs. The revolver principle applies equally to muskets, in which it will doubtless be adopted at some future time—the great objection in the case of soldiers being, that they would probably fire away, perhaps rather at random, all their ammunition with undue rapidity. Many handsome specimens of revolving guns, or 'repeating,' as they are commonly called, have been made by the gunmakers since the first part of the 17th century.

Efforts have been made to apply the revolver system to cannon, but not with great success, the necessary weight of the breech-piece rendering it somewhat cumbrous and liable to disorder.

REVULSION, in Medicine, a term synonymous with DERIVATION (q. v.). See also COUNTER-IRRITANTS.

REWARD, when used in a legal sense, means a sum of money awarded by a court or judge to a witness who has been instrumental in detecting crime. By an English act of parliament of 1827, whenever it appears to a court of assize that a person has been active in apprehending offenders charged with murder, or with feloniously shooting, stabbing, cutting, wounding, or poisoning, or with rape, burglary, house-breaking, robbery, arson, or cattle-stealing, or with receiving stolen goods, the court may order the sheriff of the county to pay to such person a sum of money, to compensate his expenses, exertions, and loss of time. So courts of quarter sessions may order a reward not exceeding £5. If any man happen to be killed while endeavouring to apprehend a criminal charged with any of these offences, the court may also order a sum to be paid to the widow or child. The going to foreign countries to apprehend criminals, is not considered to be a proper ground for giving these rewards. Nor is ordinary stealing from the person a crime which is within the act. Sometimes persons whose property has been stolen inconsiderately offer a reward for its restoration, and persons offer to receive it for a sum of money. The following enactments of the statute 24 and 25 Vict. c. 96, are directed against this practice. Whoever corruptly takes any money or reward, directly or indirectly, under pretence of helping any person to any chattel, money, valuable security, or other property which shall have been stolen, embezzled, or illegally disposed of, shall be guilty of felony, and be liable to penal servitude for seven years, or imprisonment for two years. A person may commit this offence though he has no knowledge of or connection with the thieves. Moreover, whoever shall publicly advertise a reward for the return of any property stolen or lost, and shall in such advertisement use any words purporting that no questions will be asked, or that a reward will be given, without seizing or making any inquiry after the person producing such property, or shall offer or promise to return to pawnbrokers or others any money advanced on such stolen or lost property, shall forfeit £50; and whoever shall print or publish such advertisement, shall forfeit the same sum.

REWARDS FOR DISTINGUISHED MILITARY SERVICE are annuities—most commonly of £100 each—granted to meritorious officers in consideration of distinguished service. The officers to whom they are awarded are usually major-generals or colonels, though a few quartermasters and subalterns receive these annuities, which, however, in their case rarely amount to £100. The officer holds the annuity until, being a general officer, he is appointed colonel of a regiment. The

total amount thus expended in 1864—1865 was £15,495, exclusive of £4400 divided among meritorious sergeants in annuities of £10, £15, or £20 each.

REYKIAVIK. See ICELAND.

REYNARD THE FOX, the title of a celebrated epic fable of the middle ages, belonging to, and terminating the series of poems in which 'beasts' are the speakers and actors. It is written in Low-German, professedly by a Hinreck van Alckmer, 'schoolmaster and tutor of that noble virtuous Prince and Lord the Duke of Lorraine,' and was printed at Lübeck in 1498, under the title of *Reinke de Vos;* but German critics in general are disposed to believe that no such person as Hinreck van Alckmer ever existed—he is nowhere else mentioned in history, literary or otherwise—and that the real author is a Hermann Barkhusen, town-clerk and book-printer in Rostock, who, according to a common enough practice, sent his book into the world under a pseudonym. A Rostock edition appeared in 1517, which was long believed to be the earliest, until the discovery of a copy—the only one known to exist—of the older Lübeck edition in the Wolfenbüttel Library by Professor Hakemann, who published it in 1711. Since then, the work has been repeatedly republished in Germany—the best edition being that of Hoffmann von Fallersleben (Bresl. 1834; 2d edit. 1852), which is enriched with an 'Introduction,' 'Notes,' and 'Glossary.' At a comparatively early period, translations were made from the Rostock edition into High-German, that of Mich. Beuther (Frankf. 1544), though badly executed, passing through more than 20 editions. The High-German translation was retranslated into Latin verse by Hartmann Schopper (Frankf. 1567), and thus gradually found its way into other countries. Goethe translated the work anew into modern German hexameters with admirable spirit and freshness (Berl. 1794), and his translation has been charmingly illustrated by Kaulbach (Mun. 1847): later translations are those by Soltau (Berl. 1803) and Simrock (Frankf. 1845—1852), both of which are executed in the measure of the original—i. e., rhymed iambic couplets. A Danish translation in verse by Herm. Weiger was published at Lübeck in 1555; a Swedish, at Stockholm in 1621; prose version, 1775.

This brief outline of the literary history of *Reineke Vos*, leads us to the second and even more important part of the subject. Was that work strictly an original product of the author's fancy, or was it merely the final form assumed by a wide-spread fable? Till Jakob Grimm published the results of his laborious researches, everybody supposed that the poem printed at Lübeck in 1498, by whomsoever composed, was the earliest literary embodiment, if not the direct source, of the fable; but that opinion is no longer tenable. Grimm has shewn that, in one form or another, the 'beast-fable' (Ger. *Thier-sage*) goes back to the remotest antiquity, and is a common inheritance of the Aryan or Indo-Germanic races—Hindus, Celts, Greeks, Romans, Slaves, Esthonians, Germans—and even the Finns; and he explains with great clearness the conditions of thought, intellectual and religious, under which such a literary form is developed. But all nations do not attain equal success in its cultivation, and it was among the Germans, particularly the Franks, that it attained its most complete poetical elaboration. Grimm is, however, inclined to think that the particular fable of *Reineke Vos* is of German rather than Oriental origin (although the Persian version of Pilpay's fables, entitled *Anvár-i Suhailí*, or the Lights of Canopus, translated by Mr Eastwick, Hertford, 1854, contains a story strikingly similar), and that the Franks brought it with them to the Netherlands and to France, where (and not in Low-Germany) it first appeared. Grimm published, in the *Lateinische Gedichte des 10 und 11 Jahrh.* (Gött. 1838), some small pieces, containing the nucleus or germ of the fable, and shewing how soon, in the hands of the verse-loving monks, it had been turned to didactic and satiric purposes. Somewhat later, other stories make their appearance, bearing more or less on the history of Reynard, but none of them setting forth the fable in the same manner as we now have it—the two principal being *Isengrimus* (apparently the composition of an ecclesiastic in Southern Flanders about the beginning of the 12th c., and containing two stories of the wolf) and *Reinardus* (also originating from a Flemish ecclesiastic named Nivardus, which, besides an expansion of the *Isengrimus*, contains ten new stories; its date is about half a century later). But while, in these clerical compositions, side-allusions to the papacy, to the discipline of the church, and to the then powerful and flourishing order of the Cistercians, are very noticeable, in the mouth of the Franco-Flemish people, on the other hand, the story kept itself free of such temporary phenomena, and gradually shaped itself into a style of pure epic satire, reflecting general human characteristics. Before the close of the 12th c., this purer and more epic form of the satire found its way into both German and Flemish literature. In the former, this happened about 1170, when Heinrich der Glichezare (i. e., Henry 'the Feigner'=Inventor or Troubadour), a native of Alsace, wrote in High-German his *Isengrines nôt*, and again in Flemish, a little later, when a poet, whose name is scarcely known, wrote *Der Reinaert*, a work of the purest epic character, and far surpassing all its predecessors both in conception and execution. Both works were afterwards redacted by unknown hands—the German, about the beginning of the 13th c., when its redactor gave it the title of *Reinhart* (published by Mailath und Koffinger, in the 'Koloczaer Codex,' Pesth, 1818; and again in a purer state, with all his valuable historical investigations, by Jakob Grimm, *Reinhart Fuchs*, Berl. 1834); the Flemish, about the close of the 13th c., when it received the name of *Reinaert de Vos*, part of which appeared in Grimm's *Reinhart Fuchs*, but the whole of which was published by J. F. Willems (Ghent, 1836—1850), at the expense of the Belgian government. Meanwhile, in France, the number of poems in which fables about Reynard are set forth had mightily increased, but only the oldest among those which have survived (which only reach back to about the beginning of the 13th c.) display a pure epic character. In 1826, M. Méon published a collection, in 4 vols., of the stories extant in Norman French, under the title of *Le Roman du Renart*, to which M. Chabaille, in 1835, added *Suppléments*, with various readings and corrections. The *Renart li Contrefait*, of an unknown poet of Champagne, has only been partially printed. From such sources sprung the French chap-books (*Volksbücher*), which came into vogue after the 15th century. How popular the fable became in France may be estimated from the fact, that the German word Reinhart (old form, *Ragmohart*—i. e., 'bold' or 'cunning in counsel'), which merely designates the character of the Fox, has entirely superseded the old Franco-Latin word *goupil* (from the Latin *vulpes*). The Swabian court-poetry of Germany had little in harmony with the 'beast-fable,' which was little cultivated while the former continued to flourish. In the Netherlands, on the other hand, it continued

to keep its ground, but as the mediæval spirit of poetry declined, it passed into prose—e. g., *De Hystorie van Reynaert de Vos*, published in Dutch at Gouda, in Holland, in 1479, which, in its turn, was translated into English in 1481 by William Caxton—*Hyer begynneth thystorye of Reynard the Foxe*, republished, with a few changes, by W. J. Thoms (Lond. 1844).—Thus have we sketched in meagre outline the history of the fable of Reynard the Fox in different countries, and from internal evidence it is clear, that the substance of the Low German *Reinke Vos* of Hinrek van Alkmer or Hermann Barkhusen was derived from the Flemish sources already referred to. Its peculiarity consists in this, that it is the last, best, and most complete of the whole series of poems about the Fox, gathering up into itself as it were whatever scattered merits its predecessors possess, and presenting the whole in epic unity for the pleasure and profit of all future ages. The work now consulted by general readers is Goethe's version, of which an excellent translation into English hexameter verse was made by T. J. Arnold, with illustrations by J. Wolf (Lond. 1855). For a critical appreciation of the fable, see Carlyle's 'Essay on German Literature of the Fourteenth and Fifteenth Centuries' (*Miscellanies*, vol. iii.).

REYNOLDS, Sir Joshua, P.R.A., is generally acknowledged to be at the head of the English school of painting. He was born on 16th July 1723. His father was the Rev. Samuel Reynolds, rector of Plympton St Mary, and master of the grammar-school of Plympton, Devonshire. He intended his son for the medical profession, but Joshua having manifested from an early age an ardent desire to be a painter, was, in 1741, placed under Hudson, the principal portrait painter of the day. After being in the studio of this artist two years, he commenced on his own account as a portrait-painter at Plymouth Dock, now Devonport, and met with great encouragement. In 1746 he went to London, and established himself in St Martin's Lane; but on the appointment of Commodore Keppel to the Mediterranean station, he accepted an invitation to accompany him, sailed from Plymouth in 1749, and on his arrival in Leghorn proceeded to Rome. He remained about three years in Italy, most diligently employing his time in visiting the various cities where the chief art collections are to be found. On his returning to London in October 1752, his works attracted great attention, eclipsing everything that had been done there since Van Dyck's time. When the Royal Academy was instituted in 1769, he was elected President, was knighted by George III., and on Ramsay's death, in 1784, succeeded him as painter to the king. He died in his house in Leicester Square on 23d February 1792, and after lying in state at the Royal Academy, was interred in the crypt of St Paul's. Sir Joshua lived in friendly intercourse with Johnson, Burke, and the leading men of his period. His literary works consist of fifteen Discourses delivered in the Royal Academy, three essays contributed to the *Idler*, at Dr Johnson's request, notes to Mason's translation of Du Fresnoy's *Art of Painting*, a few notes for Dr Johnson's edition of Shakspeare, and notes of his tour through Flanders in 1781. In his writings, there is much valuable information on art, imparted in an admirable manner, but he has been charged with laying down in them various rules, and holding up the works of certain schools as models for the student, while he himself did not carry out these precepts in his practice as an artist; and from this an unfair inference has been drawn, that from love of gain he cultivated portrait painting, the most lucrative branch of the profession, and recommended others to follow what is generally believed to be a more arduous but less remunerative path of art. But this accusation is most unjustly made—perhaps no other artist has handed down in writing so many practically useful maxims and observations on art. His works of this kind fortunately are numerous, and bear a very high value. There are nearly 700 engravings from R.'s pictures; most of them admirably rendered in mezzotint.—Northcote's *Life of Sir Joshua Reynolds* (2 vols. 8vo, Lond. 1819); Cunningham's *Lives of British Painters, Sculptors, and Architects* (Lond. 1854, vol. i.).

RHABDOMANCY. See DIVINING ROD.

RHADAMANTHUS, a mythical personage, son of Zeus and Europa, and brother of Minos (q. v.). He settled in Bœotia, where he married Alcmena. So great was his reputation during life for the exercise of justice, that after death he was appointed a judge in the under world, along with Minos and Æacus. His special function was to sit in judgment on the actions of all those who came to Hades from Asia.

RHÆTIC BEDS, a series of strata forming the uppermost portion of the Trias (q. v.), which are extensively developed in the Rhætian Alps. The British beds referred to this group are more highly fossiliferous than any of the other members of the Triassic period.

RHAMNACEÆ, a natural order of exogenous plants consisting of trees or shrubs, often spiny, with simple, generally alternate leaves, and stipules minute or wanting. The flowers are small, generally green. The calyx is 4—5 cleft, the petals distinct, hooded, or convolute, inserted into the throat of the calyx, occasionally wanting. The stamens are equal in number to the petals, and opposite to them; the disc is fleshy; the ovary is superior, or half superior, with two, three, or four cells; the ovules solitary. The fruit is fleshy, and does not open when ripe, or dry, and separating into three parts. The order contains about 250 known species, natives of temperate and tropical countries, and very generally distributed over the globe. Some of them are used in dyeing (see BUCKTHORN and FRENCH BERRIES), some in medicine (see RED ROOT), and the fruit of some is pleasant (see JUJUBE), whilst *Hovenia dulcis*, a native of China and Japan, is remarkable for the thickening of its flower-stalks after flowering, so as to form a succulent sweet red pulp, with a flavour resembling that of a pear.

RHAMPSINITUS, the Greek name of the Egyptian monarch Rameses III., first king of the 20th dynasty, and builder of the great palace at Medinat Habu. According to Herodotus, he placed two colossal statues of 25 cubits high in front of the west vestibule of the Hephæsteum at Memphis. He was the richest of Egyptian kings, having amassed 400,000 talents, or £77,500,000—an incredible sum for that period. This wealth was, however, probably in jewels as well as the precious metals, for both are recorded on the walls of the treasury of Medinat Habu. To secure this enormous treasure, he built a treasury of stone, one side of which adjoined the wall of his palace. In connection with this, is narrated a story which rather resembles the tale of Ali Baba in the *Arabian Nights* than the sober narrative of history. The story was told by the Egyptian dragomen of the days of the Persians to the Father of History, who naively doubts its veracity; but notwithstanding some of the German researches, which attempt to connect it with Hellenic myths of the brothers Agamedes and Trophonios, it is believed to be essentially Egyptian. R. is said to have descended to Hades, and to have played at draughts with Isis, or Ceres, and

he is so represented on the walls of his palace at Medinat Habu. His return was celebrated as a festival. Herodotus, who has inverted and confused the whole history of Egypt, calls R. the son of Proteus, and predecessor of Cheops, placing him 16 dynasties earlier than he should be. According to Lepsius, he reigned about 1275 B.C. According to Diodorus, R. was called Remphis, or rather Rempsis (Ramses), and by Pliny Ramses, in whose reign Troy was taken.

Pliny, *Hist. Nat.*, xxxvi. 8. 14, 2; Herodotus, ii. 121–124; Diodorus, i. 62; Champollion, *Not. Descr.*; Burton, *Exc. Hier.*; Sir G. Wilkinson, *Manners and Customs*, i. p. 121, and foll.; Lepsius, *Einleit.* p. 299, and foll.

RHA'PSODISTS (from Gr. *rhapto*, to string together, and *ode*, a song), in ancient Greece, were a class of persons who earned their bread by going about from place to place, reciting, in a sort of musical chant, the epic ballads of Homer and other ancient poets. They may be compared with the wandering minstrels of the middle ages; but there is this important difference, that the latter were generally the authors of the compositions which they sung. The R. were long a respected and venerated body, but lost their importance, and consequently their character, when the Homeric songs, after being written down, and perhaps woven together into their present form by the scholars at the court of Peisistratos, became generally known to the Greek world through the medium of manuscript copies. Each ballad, or at least as much as could conveniently be remembered and recited at one time, was termed a 'rhapsody,' whence the application of the term to the separate books of the *Iliad* and *Odyssey*, in which usage it is equivalent to the *Fytte* or *Canto* of Scott and Byron.

RHATANY ROOT. See RATANY ROOT.

RHE'A. See NANDU.

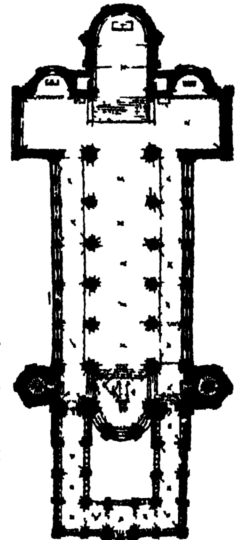
RHEA FIBRE, an exceedingly valuable East Indian fibrous material, produced by one of the nettle tribe, *Urtica tenacissima*, found in large quantities in Assam. It is very nearly like the fibre of which the Chinese make their celebrated *grass cloth*, or linen, and excepting that there are at present some difficulties in preparing it, it would at once become one of the most useful and most abundant of textile fibres; large quantities have already been imported into Britain, and it is gradually getting into use.

RHEIMS, or **REIMS,** a city and archiepiscopal see in the department of Marne, France, situated on the Vesle (a tributary of the Aisne), 107 miles east-north-east of Paris, by the Paris and Strasbourg Railway. R., a very ancient city, is built on the site of *Durocortorum*, which is mentioned by Julius Cæsar (*De Bello Gallico*, vi. 44) as the capital of the Remi, from which people it subsequently took its present name. Christianity may have found an entrance into R. at an earlier period, but it was not till the middle of the 4th c. that it became a bishop's see. Under the Frank rule it was a place of much importance, and it acquired a deeply religious interest from its having been the scene of the baptism of Clovis and his chief officers by the bishop, St Remy, in 496. In the 8th c., it became an archbishopric, and from the 12th c. (in 1179, in which year Philip Augustus was there solemnly crowned), it became the place for the coronation of the kings of France down to the time of Charles X., a vessel of sacred oil, called *la Sainte Ampoule*, to which a miraculous origin was ascribed, being preserved for the purpose. The only sovereigns in the long series, down to the Revolution of 1830, not crowned at R. were Henry IV., Napoleon I., and Louis XVIII. During the frenzy of the Revolution, the cathedral was attacked by the populace, and the sainte ampoule destroyed, in detestation of royalty; and in 1830, the ceremony of coronation at R. was abolished. R. is one of the principal entrepôts for the wines of Champagne, and the hills which surround the town are planted with vineyards. It is one of the great centres of the woollen manufacture in France, and its manufactures, embracing woollen goods, mixed fabrics in silk and wool, merinoes, &c., are known in commerce as *Articles de Reims*. The town is well built, and from the material employed in building, which is the chalk-stone of the district, and from the prevalence of the older style of domestic architecture, has a picturesque appearance. Its most striking public building is the cathedral, which, although it still wants the towers of the original design, is one of the finest extant specimens of Gothic architecture. It was built in the first half of the 13th century. Its nave is 466 feet long by 99 in breadth, with a transept of 160 feet, and the height is 144 feet. Its grandest features are the western front, which is almost unrivalled, and the so-called Angel Tower, which rises 59 feet above the lofty roof. The stained glass is remarkable for its beauty, the baptismal fonts also are of exquisite workmanship, and the organ is reputed one of the finest in France. The church of St Remy is of greater age, and nearly of equal size, but it is of less architectural pretension. The archiepiscopal province of R. comprises the sees of Soissons, Châlons, Beauvais, and Amiens. Pop. (1862) 51,693.

RHEINGAU, a district stretching along the right bank of the Rhine, formerly belonging to the archbishopric of Mainz, now forming the south-west portion of the duchy of Nassau, is about 12 miles long, and 6 broad. The principal town is Eltfeld, with about 2200 inhabitants. This district, one of the richest in Germany, protected by mountains from the north and east winds, and exposed to the mid-day sun, produces wines of the best quality.

RHEIN-HESSE. See HESSE-DARMSTADT.

RHENISH ARCHITECTURE, the style of the countries lying along the Rhine, when the arts first revived after the fall of the Roman empire. Being, at the time of Charlemagne, part of the same empire with Lombardy, the arts of that country (see LOMBARD ARCHITECTURE) spread northwards, and similar buildings sprung up north of the Alps. There are almost no traces of architecture in Germany before the time of Charlemagne. It received great encouragement from him and his successors, and the Rhenish style made great progress up to the beginning of the 13th c., when the fashion of copying the Gothic architecture of France superseded it. It is, however, a well-marked style, and is complete and perfect in itself. Like the Lombard style, it is round arched, and has some


Fig. 1.—Plan of Church at Laach.

remarkable peculiarities. The earliest churches seem to have been all circular (like the Dom at Aix-la-Chapelle, built by Charlemagne), and when this was abandoned, the circular church was absorbed into the Basilica, or rectangular church (see ROMANESQUE ARCHITECTURE), in the form of a *western* apse. Most German churches thus have *two apses*—an eastern and a western. They also have a number of small circular or octagonal towers, which seem to be similar in origin to the Round Towers of Ireland. They exemplify in a remarkable manner the arrangements of an ancient plan of the 9th c., found in the monastery of St Gall, and supposed to have been sent to the abbot, as a design for a perfect monastery, to aid him in carrying out his new buildings. The arcaded galleries at the

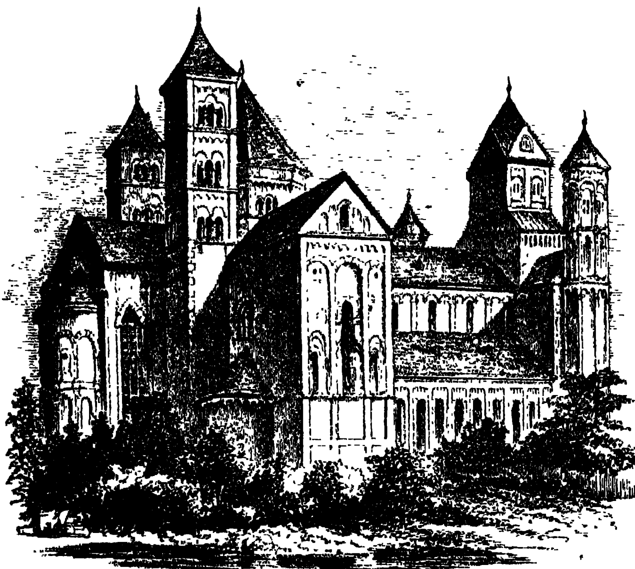


Fig. 2.—Elevation of Church at Laach.

eaves, and the richly-carved capitals, are among the most beautiful features of the style. Examples are very numerous from about 1000 to 1200 A.D. The three great types of the style are the cathedrals of Mayence, Worms, and Spires. The last is a magnificent building, 435 feet long by 125 feet wide, with a nave 45 feet wide, and 105 feet high. It is grand and simple, and one of the most impressive buildings in existence. There are also numerous fine examples of the style at Cologne—the Apostles' Church, Sta Maria in Capitulo, and St Martin's, being amongst the most finished examples of Rhenish Architecture. The illustrations of the church at Laach explain the peculiarities of plan and elevation above referred to. It will also be observed that there is a paradise or pavis in front of the entrances. The vaults in this case being small, the different spans were managed (although with round arches) by stilting the springing; but in great buildings like Spires and Worms, the vaults are necessarily square in plan, in this round-arched style, and the nave embraces in each of its bays two arches of the side aisles—a method also followed by the early Gothic architects. From the use of the round arch and solid walls, the exteriors are free from the great mass of buttresses used in Gothic buildings, and the real forms are distinctly seen.

RHENISH PRUSSIA (Ger. *Rheinprovinz*, or *Rheinpreussen*), the most western of the provinces of Prussia, forms an outlying district of that monarchy, lying along the banks of the Rhine, separated by a number of German states from the main portion of the kingdom, and bounded on the W. by Belgium and the Netherlands. Area, 10,230 sq. m.; pop. (1862) 3,175,688. In the south, the surface is mountainous, the principal ranges being the Hundsrück, the Eifelgebirge, and branches of the Westerwald. The largest river is the Rhine, which flows through the province in a north-north-west direction for 200 miles, and receives many affluents from left and right. The surface is everywhere more or less mountainous, except in the extreme north, and the soil of the higher mountain-tracts barely supports the inhabitants; while that of the valleys of the Rhine, Moselle, and Nahe are very fruitful, and the flat districts in the north are most productive in grain. Timber and minerals, including lead, copper, zinc, coal, &c., abound; and the warm and hot sulphur-springs of Aix (q.v.) and Burtscheid (q. v.) have a European reputation. Industry and manufactures are here prosecuted with the utmost energy, and with great success. The cotton manufactures of the Wupperthal, the silk manufactures of Krefeld and vicinity, and the woollen cloth and Cashmere manufactures of the district of Aix, are famous. R. P. came into the possession of Prussia by the treaty of Vienna in 1815. It consists of the former duchies of Cleves, Gelders, and Berg, of the principalities of Mörs and Lichtenberg, the northern and middle parts of the former archbishopric of Cologne, numerous lordships, portions from the four French departments of Rhein-Mosel, Mosel, de Forêts, and Saar, &c.

RHE'SUS MONKEY (*Macacus Rhesus*), an Indian monkey, extending further north than any other species except the Entellus (q.v.), or Honuman, and, like it, partially migratory, visiting regions of the Himalaya in summer, which are far too cold for



Rhesus Monkey (*Macacus Rhesus*).

it in winter. It is held in almost as great veneration by the natives of India as the Honuman itself; and the killing of one of these animals is apt to arouse the greatest popular indignation. The monkeys live in troops in the forests, chiefly in

hilly districts, and visit the cultivated grounds to carry away grain and other produce, which they store up for themselves among rocks. The native farmers leave a share for the monkeys, believing this to be necessary for the averting of their anger, as otherwise, next year, they would destroy the whole crop whilst green. The R. M. has a stout form, stout limbs, short ears, a short tail, large callosities, the skin hanging loose about the throat and belly, the hair rather long, the back brownish, the lower part of the back and the haunches bright chestnut, or almost orange, the shoulders and arms lighter. It is one of the most intelligent and mischievous of monkeys.

RHE'TORIC (Gr. *rhētorikē*, from *rhētor*, an orator) in its broadest sense may be regarded as the theory of eloquence, whether spoken or written. It aims at expounding the rules which should govern all prose composition or speech designed to influence the judgments or the feelings of men, and therefore treats of everything that relates to beauty or force of style—e. g., accuracy of expression, the structure of periods, and figures of speech. But in a narrower sense rhetoric concerns itself with a consideration of the fundamental principles according to which particular discourses of an oratorical kind are composed. The three chief elements of an oration are usually held to be—*inventio*, or the discovery of proper ideas; *dispositio*, or their arrangement; and *elocutio*, or the style in which they are expressed. The ancients, however, who cultivated oral eloquence more than the moderns do, reckoned other two—viz., *memoria*, or memory, and *actio*, or gesticulation. The most distinguished writers on rhetoric in ancient times were Aristotle, Cicero, and Quinctilian; in modern times, Blair, Campbell, Whately, and Spalding among the English; Erneste Maass, Schott, Richter, and Falkmann among the Germans; and among the French, Rollin, Gibert, Le Batteux, La Harpe, Marmontel, and Andrieux.

RHEU'MATISM (from the Gr. *rheuma*, a flux) is a blood-disease in which inflammation of the fibrous tissues is the most marked characteristic. It occurs either as an acute or as a chronic affection; there is, however, no distinct line of demarcation between the two, and the latter is often a consequence of the former.

Acute rheumatism is indicated by general febrile symptoms, redness, heat, swelling, and usually very intense pain, in and around one or more (generally several, either simultaneously or in succession) of the larger joints, and the disease shews a tendency to shift from joint to joint or to certain internal fibrous membranes, and especially the pericardium; rheumatism being the most common origin of pericarditis, as has been already shewn in the article on that disease. The pulse is strong and full, there is headache, but seldom delirium, unless the heart is affected; the tongue is covered with a creamy thick fur, the tip and edges being red; the urine is turbid, and abnormally acid; and the skin is bathed in a copious perspiration, with so characteristic a smell (resembling that of sour-milk), that the physician can often recognise the disease almost before he sees the patient. The joints are extremely painful, and the pain is much increased by pressure, and consequently by movement which gives rise to internal pressure. Hence the patient lies fixed in one position, from which he dares not stir. There are two varieties of acute rheumatism. In one, the inflammation commences not *in* the joint, but *near* it, and attacks the tendons, fasciæ, ligaments, and possibly the muscles themselves. This form is termed *fibrous* or *diffused* rheumatism. In the other variety, the synovial membrane in the joint becomes affected, and an excess of fluid is poured into the joint, distending the membrane, and making it bulge out between the spaces intervening between the various tendons, ligaments, &c., round the joint. It is the knee-joint which is most commonly affected in this way, and fluctuation may readily be perceived on applying the hands to the two sides of the knee. In this form, which is called *synovial* rheumatism, the swelling and redness come on sooner, and are more marked than in the former variety. The fibrous is by far the most severe form, and it is to it that the previous sketch of the most marked symptoms chiefly applies. In the synovial form, the fever is less intense, the tongue less foul, the perspiration far less profuse, and the membranes of the heart are much less liable to be attacked. It is to this form that the term *rheumatic gout* is often applied, and it is by no means inappropriate, because synovial rheumatism forms (as Dr Watson has observed) a connecting link between gout and rheumatism, and partakes of the characters of both.

The only known exciting cause of acute rheumatism is exposure to cold, and especially to cold combined with moisture, and hence the greater prevalence of this disease amongst the poor and ill-clad. Sleeping in damp sheets or upon the damp ground, the wearing of wet clothes, and sitting in a cold damp room, especially if the sitter was previously warm from exercise, are examples of the kind of exposure which is apt to be followed by this disease. The excreting power of the skin being checked by the action of cold, certain effete matters which should be eliminated in the form of perspiration, are retained, and accumulate in the blood, which thus becomes poisoned. This blood-poisoning is not, however, a universal sequence to exposure to the cold. It only occurs when there is a special predisposition to this disease, or, as it is termed, a rheumatic diathesis or constitution, and the diathesis may be so strongly developed as to occasion an attack of acute rheumatism, independently of exposure to any apparent exciting cause. Men are more subject to the disease than women, but this probably arises from their greater exposure to atmospheric changes from the nature of their occupations. The predisposition is certainly affected by age; children under ten years, and adults over sixty, being seldom attacked, while the disease is most prevalent between the age of fifteen and forty. Persons once affected become more liable to the complaint than they previously were. Dr Fuller believes, from his observations made in St George's Hospital, that the disease is sometimes hereditary; whether this be the case or not, there can be no possible doubt that the predisposition is very apt to exist in members of the same family. The exact nature of the poison is unknown. The late Dr Prout regarded lactic acid as the actual *materies morbi*, and certain experiments recently made by Dr Richardson tend to confirm this view.

The danger in cases of acute rheumatism arises almost entirely from the disease going from the joints to the heart, and setting up Pericarditis (q. v.). Hence that mode of treatment will be best which tends most surely to prevent, or, at all events, to lessen the risk of this complication. If the patient is a young person of robust constitution, and there are well-marked inflammatory symptoms (such as a flushed face and a bounding pulse), he should be at once bled from the arm. A large quantity of blood can usually be taken before any signs of faintness occur, and the bleeding is serviceable in at least three points of view. In the first place, it almost always mitigates the pain, and diminishes the febrile symptoms;

secondly, it enables other remedies, as calomel, opium, colchicum, &c, to act more efficiently, and thirdly it may occasionally cut short the attack of the disease, which, if not arrested by treatment, may run on for six weeks two months, or even longer Unfortunately, however the cases of rheumatism which are fit to bear free venesection are comparatively few, especially in large towns, and further it often happens that the physician is not called in till the proper time for free depletion is past Purging is probably almost as efficacious as blood letting at the beginning of the disease From five grains to a scruple of calomel given every night, and followed in the morning for three or four days in succession by an ordinary black draught, will sometimes dislodge an enormous amount of dark and foul secretions from the liver and bowels and give marked relief The main drawback to this mode of treatment is the pain occasioned by changing the position when the bowels act but this may be to a great extent obviated by the use of the bed pan. Opium (or morphia) is one of the most valuable remedies in this disease from its power of allaying pain and procuring sleep Dr Corrigan of Dublin trusts to opium alone for the cure He begins with one grain and repeats that quantity (or a larger dose if necessary) at intervals of two hours, until the pain disappears He has had twelve grains in the twenty four hours to the average amount required but half that quantity (or even less) will generally suffice if the opium be combined with other remedies as, for example if it be given with ipecacuanha (as in Dover's Powder) or with small doses of calomel Colchicum sometimes has a marvellous effect in subduing the disease but it must be given with extreme care, in consequence of the prostration to which an over dose gives rise See Poisons Dr Watson believes that this remedy is of most value when synovial symptoms are present or when in other words, the rheumatism approach smits character to gout 'Large doses he says are not requisite Twenty minims of the wine or of the tincture may be given every six hours until some result is obtained' The abnormal acidity of the various fluids (the sweat urine, and even the saliva) in acute rheumatism has led to the belief that alkaline remedies would both neutralise the poison and, from their diuretic properties tend to eliminate it The bicarbonate of potash in solution has been largely tried by Dr Garrod who administered it in average doses of two scruples every two hours by night and day, for several days together Of 51 cases so treated, the average period of treatment was between six and seven days and the average duration of the disease was slightly under a fortnight The medicine soon rendered the urine alkaline, but did not irritate either the bladder or the intestines It seemed rapidly to calm the pulse and to allay the febrile heat and in no case did any heart complication arise after the patient had been forty eight hours under its influence Other physicians, including the late Dr Golding Bird prefer the acetate of potash The mode of treatment by lemon juice in doses of one or two ounces five or six times a day, originally advocated by Dr G O Rees, at first sight seems in direct antagonism to the alkaline mode of treatment As however the most active principle in the lemon juice is citrate of potash, which, before it reaches the kidneys, becomes converted into carbonate of potash there is less essential difference between the acid and the alkaline mode of treatment than at first sight seems to be the case During the last few weeks (January 1865), a new mode of treating acute rheumatism has been warmly advocated by Dr Davies of the London Hospital It mainly consists in the application of a series of blisters to the parts surrounding and adjacent to the affected joints One of our highest authorities on this disease, Dr Fuller of St George's Hospital, after trying various hot external applications, finds that a mixed alkaline and opiate solution is far more powerful than any other in allaying acute rheumatic pain The solution which he now usually employs is made by dissolving half an ounce (or rather more) of carbonate of potash or soda in nine ounces of hot water, and adding six fluid drachms of Battley's *Liquor opii sedativus* Thin flannel, soaked in this hot lotion is applied to the affected joints, and the whole is wrapped in a covering of thin gutta percha

Cases which are intermediate between acute and chronic rheumatism are of very common occurrence. In those cases of what may be termed *subacute* rheumatism there is slight fever, and several joints are usually affected without intense inflammation in any one joint These cases soon shew signs of amendment under a mild alkaline treatment, as, for example a drachm of liquor potassæ daily, well diluted and divided into three or four doses, and the moderate use of purgatives

In all cases of acute and subacute rheumatism, the heart sounds should be examined daily, or even oftener, with the view of detecting the earliest trace of cardiac affection and, if possible, of checking its further development For the treatment to be adopted when there is evidence that the membranes of the heart are affected, the reader is referred to PERICARDITIS (q v)

There are two kinds of *chronic rheumatism*, which are sufficiently distinct to require notice In one there is considerable local heat and swelling, although unaccompanied with any corresponding constitutional disturbance while in the other the patient complains of coldness (rather than heat) and stiffness of the affected joints The former approximates most closely to the previously described forms of rheumatism of which it is frequently the sequel and must be treated in a similar manner, while the latter which is termed by some the passive form usually occurs as an independent affection In passive rheumatism the pain is relieved by friction and the patients are most comfortable when warm in bed conditions which increase the pain in the former variety Patients of this kind derive benefit from living in a warm climate, from warm clothing, warm bathing, especially in salt water at a temperature of not less than 100°, the hot air bath &c Friction with some stimulating liniment and the peculiar manipulation known as shampooing are here of service, and amongst the internal remedies turpentine, cod liver oil, sulphur, guaiacum, sarsaparilla, and Dover's Powder possess a high reputation * Dr Fuller recommends the muriate of ammonia as a remedy of 'singular efficacy' but of all remedies for this affection there can be little doubt that the most efficacious is the iodide of potassium, given in five grain doses, combined with a few grains of carbonate of ammonia three times daily A patient who is liable to attacks of chronic rheumatism should always wear flannel next the skin during the day, and at night he should sleep between the blankets, abjuring altogether the use of sheets

RHEUMATIC DISEASES are less common in the lower animals than in men Horses are not very liable to acute rheumatism, but suffer from a chronic variety, which occurs especially in conjunction with influenza When affecting the limbs, it often exhibits its characteristic tendency to shift from one part to another. In cattle and sheep, rheumatic disorders

are more common and acute than in horses. The specific inflammation sometimes involves most of the fibrous and fibro-serous textures throughout the body, inducing general stiffness, constipated bowels, and high fever. This is rheumatic fever—the chine-felon or body-garget of the old farriers. Sometimes the disease mainly affects the larger joints, causing intense pain, lameness, and hard swellings; occasionally it is confined to the feet and fetlocks, when it is recognised as bustian-foul. Cattle and sheep on bleak exposed pastures, and cows turned out of the dairy to feed on strong alluvial grazings, are especially subject to rheumatism in its several forms. Amongst dogs, rheumatism is known under the name of kennel lameness, and is very troublesome and intractable in low, damp, cold situations. Blood-letting is rarely admissible except in the most acute cases amongst cattle. In all animals, a laxative should at once be given, with some saline matters and colchicum, and when the pain and fever are great, a little tincture of aconite may be added. For cattle, a good combination consists of one ounce of nitre, two drachms of powdered colchicum, and two fluid drachms of the Pharmacopœia tincture of aconite, repeated in water or gruel every three hours: half this dose will suffice for horses. With a simple laxative diet, dogs should have a pill night and morning containing five grains of nitre and two of colchicum. Comfortable lodgings, a warm bed, horse-rugs on the body, and bandages on the legs, will greatly expedite a cure. In chronic cases, or after the more acute symptoms are subdued, an ounce of oil of turpentine, and two drachms each of nitre and powdered colchicum, should be given for a cow, half that quantity for a horse, and one-fourth for a sheep. Hartshorn and oil, or other stimulating embrocations, diligently and frequently rubbed in, will often abate the pain and swelling of the affected joints.

RHIME, or **RHYME**, is more properly, perhaps, written *rime*, as it does not seem to be derived from the Greek *rhythm*, but to be a native Teutonic word, from the same root, probably, as Ger. *reihe*, a row, verb *reihen*, to array; also *reihen*, a song or a chain-dance, of which *reim* may be only a variety. In Ang.-Sax., *rim-craeft*, meant the art of numbering; *riman*, to number; and thus *rime*, although a native Teutonic word, may ultimately be from the same Aryan root as the Greek *Rhythm* (q. v.), which etymologists derive from *rheo*, to flow. In early English, rhime (and the same is true of Ger. *reim* and the other forms of the word in other northern tongues as well as in the Romance) meant simply a poem, a numbered or versified piece (compare Lat. *numeri*, numbers = verses, versification); but it has now come to signify what is the most prominent mark of versification in all these tongues, namely, the recurrence of similar sounds at certain intervals. As there may be various degrees and kinds of resemblance between two syllables, there are different kinds of rhime. When words begin with the same consonant, we have *Alliteration* (q. v.), which was the prevalent form of rhime in the earlier Teutonic poetry (e. g., Anglo Saxon). In Spanish and Portuguese, there is a peculiar kind of rhime called *Assonance*, consisting in the coincidence of the vowels of the corresponding syllables, without regard to the consonants; this accords well with the character of these languages, which abound in full-toned vowels, but is ineffective in English and other languages in which consonants predominate. In its more usual sense, however, rhime denotes correspondence in the final syllables of words, and is chiefly used to mark the ends of the lines or verses in poetry. Complete identity in all the parts of the syllables constitutes what the French call *rich* rhime, as in *modèle*, *fidèle*; *beauté*, *santé*. But although such rhimes are not only allowed but sought after in French, they are considered faulty in English, or rather as not true rhimes at all. No one thinks of making *deplore* rhime with *explore*. Rhyming syllables in English must agree in so far, and differ in so far; *the vowel and what follows it—if anything follow it—must be the same in both; the articulation before the vowel must be different.* Thus, *mark* rhimes with *lark*, *bark*, *ark*, but not with *remark*. In the case of *mark* and *ark*, the absence of any initial articulation in the last of the two makes the necessary difference. As an example of rhime where nothing follows the vowel, we may take be-*low*, which rhimes with fore-*go*, or with *O!* but not with *lo*. To make a perfect rhime, it is necessary, besides, that the syllables be both accented; *free* and merri*ly* can hardly be said to rhime. It is almost needless to remark, that rhime depends on the sound, and not on the spelling. *Plough* and *enough* do not make a rhime, nor *case* and *decease*.

Such words as *roaring*, de-*ploring*, form *double* rhimes; and an *nuity*, gra-*tuity*, *triple* rhimes. In double or triple rhimes, the first syllable must be accented, and the others ought to be unaccented, and to be completely identical. In the sacred Latin hymns of the middle ages, the rhimes are all double or triple. This was a necessity of the Latin language, in which the inflectional terminations are without accent, which throws the accent in most cases on the syllable next the last—do-*lorum*, vi-*rorum*; sup-*plicia*, con-*vicia*. Although rhimes occur chiefly between the end-syllables of different lines, they are not unfrequently used within the same line, especially in popular poetry:

> And then to see how ye're negleckit,
> How *huff'd*, and *cuff'd*, and disrespeckit.
> *Burns.*

> And ice mast-*high* came floating *by*.
> *Coleridge.*

(See Leonine Verses.)

When two successive lines rhime, they form a *couplet*; three form a *triplet*. Often the lines rhime alternately or at greater intervals, forming groups of four (*quatrains*) or more. A group of lines embracing all the varieties of metre and combinations of rhime that occur in the piece, forms a section called a *stave*, sometimes *stanza*, often, but improperly, a *verse*. In the days of Acrostics (q. v.) and other conceits, it was the fashion to interlace rhimes in highly artificial systems; the most complex arrangements still current in English are the Sonnet (q. v.) and the Spenserian (q. v.) stanza. Tennyson has accustomed the English ear to a quatrain, in which, instead of alternate rhimes, the first line rhimes with the fourth, and the second with the third.

It is a mistake to suppose that rhime is a mere ornament to versification. Besides being in itself a pleasing musical accord, it serves to mark the endings of the lines and other sections of the metre, and thus renders the Rhythm (q. v.) more distinct and appreciable than the accents alone can do. So much is this the case, that in French, in which the accents are but feeble, metre without rhime is so undistinguishable from prose, that blank verse has never obtained a footing, notwithstanding the war once waged by French scholars against rhimed versification. 'The advantages of rhime,' says Guest (*English Rhythms*), 'have been felt so strongly, that no people have ever adopted an accentual rhythm without also adopting rhime.' The Greek and Latin metres of the classic period, depending upon time or quantity, and not upon accent, were able to dispense with the accessory of

rhime; but, as has been well observed by Trench (*Sacred Latin Poetry, Introduction*, 1864), even 'the prosodic poetry of Greece and Rome was equally obliged to mark this (the division into sections or verses), though it did it in another way. Thus, had dactyls and spondees been allowed to be promiscuously used throughout the Hexameter (q. v.) line, no satisfying token would have reached the ear to indicate the close of the verse; and if the hearer had once missed the termination of the line, it would have been almost impossible for him to recover it. But the fixed dactyl and spondee at the end of the line answer the same purpose of strongly marking the close, as does the rhime in the accentuated verse; and in other metres, in like manner, licences permitted in the beginning of the line are excluded at its close, the motives for this greater strictness being the same.' It is chiefly, perhaps, from failing to satisfy this necessary condition, that modern unrhimed verse is found unsatisfactory, at least for popular poetry; and it may be doubted whether it is not owing to the classical prejudices of scholars that our common English blank verse got or maintained the hold it has.

The objection that rhime was 'the invention of a barbarous age, to set off wretched matter and lame metre,' rests on ignorance of its real history. It cannot be considered as the exclusive invention of any particular people or age. It is something human, and universal as poetry or music—the result of the instinctive craving for well-marked recurrence and accord. The oldest poems of the Chinese, Indians, Arabians, &c., are rhimed; so are those of the Irish and Welsh. In the few fragments of the earliest Latin poetry that are extant, in which the metre was of an accentual, not quantitative kind, there is a manifest tendency to terminations of similar sound. This native tendency was overlaid for a time by the importation from Greece of the quantitative metres; yet even under the dominance of this exotic system, rhiming verses were not altogether unknown; Ovid especially shews a liking for them:

Quot cœlum stellas, tot hab t tua Roma puellas;

and in the decline of classicality they become more common. At last, when learning began to decay under the irruptions of the northern nations, and a knowledge of the quantity of words a thing in a great measure arbitrary, and requiring to be learned—to be lost, the native and more natural property of accent gradually reappeared as the ruling principle of Latin rhythm, and along with it the tendency to rhime. It was in this new vehicle that the early Christian poets sought to convey their new ideas and aspirations. The rhimes were at first often rude, and not sustained throughout, as if lighted upon by chance. Distinct traces of the adoption of rhime are to be seen as early as the hymns of Hilary (died 368), and the system attained its greatest perfection in the 12th and 13th centuries. In refutation of the common opinion, that the Latin hymnologists of the middle ages borrowed the art of rhime from the Teutonic nations, Dr Guest brings the conclusive fact, that no poem exists written in a Teutonic dialect with final rhime before Otfried's *Evangely*, which was written in Frankish about 870. Alliteration had previously been the guiding principle of Teutonic rhythms; but after a struggle, which was longer protracted in England than on the continent, it was superseded by end-rhimes.—See Guest's *History of English Rhythms* (2 vols., Lond. 1838), where the whole subject is learnedly and elaborately treated; Trench's *Sacred Latin Poetry, Introduction* (Lond. 1864); F. Wolf, *Ueber die Lais, Sequenzen, und Leiche* (Heid. 1841).

RHIN, BAS (LOWER RHINE), a frontier department in the north-east of France, formed, together with the province of Haut-Rhin, from the former French province of Alsace (q. v.), the German Els-ass, and, prior to the treaty of Ryswick, one of the most densely-peopled and industrious of the German states. The department of Bas-Rhin is bounded on the E. by Baden, and on the W. by the departments of Moselle, Meurthe, and Vosges. Area, 1758 sq. m.; pop. (1862) 577,574. It lies almost wholly within the basin of the Rhine, which flows north along its eastern border, and its surface is traversed by a large number of affluents and sub-affluents, which flow westward into that river. The Ill, from Haut-Rhin, joins the Rhine a few miles below Strasbourg; and the chief of the other affluents are the Lauter and Moder. The eastern portion of the department, lying along the left bank of the Rhine, consists wholly of plains; while in the west are the rugged and wooded heights which form the eastern slopes of the Vosges Mountains. A projection of the department to the north-west includes a portion of these mountains. In the hilly regions are many beautiful valleys. The winters are long and cold; the summer variable; the autumns always fine. Cretinism and goitre prevail in some parts, though to a less extent now than formerly. The country is unusually rich in agricultural and manufacturing resources and capabilities. A great variety of grains, fruits, and vegetables, including fine crops of hemp and tobacco, are grown extensively; and wines, red and white, the latter held in the highest estimation, are produced abundantly. The wines belong to the class of dry wines called *vins du Rhin* (Rhine wines), and about 11,000,000 gallons are made annually. Manufactures, textile and other, are carried on on a grand scale. Spinning mills, weaving factories for cotton, calico, woollen, and other fabrics, are exceedingly numerous, and foundries, arms and machine factories also abound. Some timber, floated down the Rhine in rafts, is exported. The department is divided into the four arrondissements of Strasbourg, Saverne, Schlestadt, and Wissembourg. The capital is Strasbourg.

RHIN, HAUT (UPPER RHINE), a frontier department in the east of France, bounded on the N. by the department of Bas-Rhin (q. v.), and on the E. by Germany and Switzerland. Area, 1586 sq. m.; pop. (1862) 515,802. As in the case of the department of Bas-Rhin, the eastern frontier is for the most part formed by the Rhine, and the western frontier by the Vosges Mountains; and, as might be expected, the character of the surface much resembles that of that department. After the Rhine, the principal river is the Ill, into which the streams from the Vosges Mountains flow. In the middle of the department the soil is fertile, and of the valleys of the west some are exceedingly rich and productive. The climate is more inclement than that of Bas-Rhin. Of the entire surface of 1,015,040 acres, considerably more than one-third is under crop; 336,000 acres, principally in the long narrow tract between the Ill and the Rhine, are in wood; 130,000 acres in good rich pastures; and about 30,000 acres in vineyards. In agriculture, and in trade and manufactures, this department shews similar activity and enterprise with that of Bas-Rhin (q. v.). About 8,800,000 gallons of wine are made annually. The department is divided into the three arrondissements of Colmar, Altkirch, and Belfort. The capital is Colmar.

RHINANTHUS, a genus of plants of the natural order *Scrophulariaceæ*, having an inflated 4-toothed calyx; the upper lip of the corolla

compressed laterally, furnished on both sides below the tip with a straight tooth or lobe, the lower one plane and 3-lobed. The capsule is compressed and 2-celled. *R. crista galli* is a very common British plant, an annual, 1—2 feet high, to be seen in almost every meadow and in many pastures, with yellow flowers, and rather large capsules, in which the seeds rattle when ripe, whence its common name, *Yellow Rattle*. It is also called Cock's comb, from its fringed bracts.

RHINE (*Rhenus*), the most important river in Germany, and one of the most noted in Europe, takes its rise in the Swiss canton of the Grisons, and after a north-north-west course of about 800 miles, falls into the German Ocean. The area of the R. basin, including its various feeders which have been counted to the number of 12,000, is estimated at about 86,000 sq. miles. The R. is divided into the Upper, Middle, and Lower R., the first of these terms being applied to the river from its source to Basel, the second applies to its course from Basel to Cologne, and the last to its course from Cologne through the Netherlands to the sea, into which it empties itself by several mouths, forming an extensive delta. The head-waters of the Upper R. consist of three main streams, called respectively the Vorder R., the Mittler R., and the Hinter Rhine. The first and most easterly rises on Mount Crispalt, north-east of Mount St Gothard, 7500 feet above the level of the sea, and flowing east, bursts like a torrent through a deep ravine. At Dissentis, 12 miles from its source, it is joined by the Mittler R., or central branch, at the comparatively low level of 3500 feet. At Reichenau, 50 miles from the source of the Vorder R., the stream is swelled by the third branch, known as the Hinter R., which, taking its rise among the glaciers of the Vogelberg, flows over a distance of 80 miles before it blends its waters with the main branches. The Hinter R., considerably the longest of the upper waters, claims to be esteemed the chief source, and at its confluence with the other branch at Reichenau, the river first assumes the general name of Rhine. At Coire, where the river takes a sudden turn northward, it is nearly 150 feet wide, and navigable for rafts and flat boats. A little above the small town of Sargans in St Gall, it leaves the Grisons, and forming the boundary between the small principality of Lichtenstein and the Vorarlberg on the right, and St Gall on the left, flows in a northerly direction to Rheineck, where it enters the Boden See, or Lake of Constance, which may indeed be regarded as the river itself augmented in its course between Rheineck and Constance by the confluence of numerous streams. Emerging from the Upper Lake at Constance, the R. enters the Unter See, or Lower Lake, a few miles below, and following a westerly course, forms the boundary line between Switzerland and the grand-duchy of Baden, and after receiving the Thur, Töss, and Aar on the left, and the mountain torrents of the Wutach and Alb on the right, pursues its course to Basel. At Schaffhausen, about 15 miles from the western extremity of the Unter See, the waters of the river, rushing over a rock 70 feet high, form the cataract known as the Falls of Schaffhausen, while lower down the narrowing of the channel through the projection of rocks on either side gives rise to rapids both at Laufenburg, and at a point ten miles below it, known as Hollenhacken, where the navigation is impeded for a considerable distance by the force of the cataracts. Below Basel, the R., turning again due north, separates France from Baden, forms the eastern boundary of Rhenish Bavaria, cuts the province of Rhine-Hesse in two, and flows between Nassau and the Prussian Rhine provinces, through which it afterwards pursues a north-west course. Before it reaches Cologne, it takes up numerous tributaries and affluents—viz., the Ill, Wiese, Elz, Kinzig, Murg, Neckar, Main, Lahn, Moselle, &c., and passes the cities of Breisach, Strasburg, Germersheim, Speier, Mannheim, Worms, Oppenheim, Mainz, Bingen, Coblenz, and Bonn. In this middle part of its course the river makes great bends, the current is rapid, and navigation is rendered difficult by numerous small islands and sandbanks, which are subject to changes of form and position. Much has been done to improve the R. above Bingen. By an agreement made, in 1840, between France and Baden, it has been brought into its proper channel, and considerably shortened. The valley through which the R. runs between steep banks from Mainz to Bonn contains the picturesque scenery which has made this river so celebrated, and the vineyards from which the famous Rhenish wines are obtained. From Cologne to its mouths, the R. flows through a low level country, and soon after entering the Netherlands, divides it into two arms, the left called the Waal, uniting with the Maas near Fort Loevestein, and forming the Merwede or Merwe, which below Dordrecht takes the name of the Old Maas; the right arm, called the R., a little above Arnheim, throws off the New Yssel, originally a canal, cut by Drusus to connect the R. with the Old Yssel. Flowing on to Wijk bij Duurstede, the R. divides again into the Lek, which unites with the New Maas near Ysselmonde, and the Krumme Rhine, which at Utrecht parts into the Vecht and the Old R., the latter is a small stream entering the North Sea by the Katwijk canal to the north-west of Leyden. The delta of the R., which extends from about 51° 35' to 52° 20' N. lat., and occupies nearly 50,000 sq. m. of territory, belonging to the Dutch provinces of North and South Holland, Utrecht, and Guelderland, requires to be protected by strong embankments. The ground of the [illegible], which begin at Wesel, are about 20 or 30 feet above the lowest level of the river. Several canals connect the R. with the Rhone and Saone, the Scheldt, Meuse, and Danube, and thus open a line of communication with France and Belgium on the one side, and with the Netherlands and every part of Germany on the other. The commerce and navigation of the R., which are of great extent and great importance, are regulated by treaties between the different states through which it passes, all of which levy tolls on vessels and goods entering their respective territories, and thus produce an accumulation of duties which press heavily on the transit trade. Steam-navigation is, however, conducted with greater regularity and energy on the R. than on any other river of Germany, and of late years, since the main lines of railway, running on either side of the river, have been connected by a bridge between Cologne and Deutz, additional importance and extension have been given to the commercial relations of all the countries connected with the Rhine. Pontoon or boat bridges cross the river at Cologne, Mainz, Mannheim, and a few other places.

RHINE, CONFEDERATION OF THE. See CONFEDERATION OF THE RHINE.

RHINE-WINE is a term of very general signification, applied, however, most frequently to those wines produced in the Rheingau (q. v.). The most valued and costly of these are the Schloss Johannisberger, Hochheimer, Kloster Erbacher, Rudesheimer, Steinberger, Grafenberger, Rauenthaler, Rothenberger, Scharlachberger, and Markobrunner. The red Rhine-wines, of which the Asmannshauser

is the most celebrated, are not nearly so much prized as the white; neither have they the strength or bouquet of the latter. The wines of the Lower Rhine, from Dusseldorf downwards, are generally of inferior quality.

The term Rhine-wine, in its general signification, includes the Pfalz and Moselle wines It is now generally held in Germany that Rhine-wines that have been properly kept for three or four years are in the most wholesome condition for use; the very old stocks no longer find a ready market except in Russia and England.

RHINO'CEROS (Gr. nose horned), a genus of *Pachydermata Ordinaria*, containing the largest and most powerful of terrestrial mammalia, except the elephants. There are at least seven or eight existing species, all natives of the warm parts of Asia, the Indian Archipelago, and Africa; and numerous fossil species have been discovered in the newest geological deposits. The form of the R. is clumsy and uncouth; its aspect dull and heavy. The limbs are thick and strong; each foot is terminated by three toes, which are covered with broad hoof-like nails. The tail is small, and terminated by a small tuft. The ears are moderately large; the eyes very small. The head is large, the muzzle prolonged, and the nasal bones combined into an arch for the



Rhinoceros (*R. Indicus*).

support of a horn, which, however, does not spring from them, but merely from the skin, a second horn, in some of the species, growing above it, in like manner springing from the skin, and resting for support on the bone of the forehead. The upper lip is more or less prolonged and prehensile, in some of the species so much so that it is capable of being used to pick up very small objects. The whole body, head, and limbs are covered with an extremely thick and hard skin, which in none of the existing species exhibits more than mere traces of hair, although there is evidence that some of the extinct ones were covered with fur; and the hardness of the skin being such that in some of the species it has not pliancy enough to permit the movements of the animal, it is in a manner jointed by means of folds on the neck, behind the shoulders, in front of the thighs, and on the limbs.

The horn of the R. is a very remarkable organ, and a powerful weapon of offence and defence. With it also the animal can root up bushes or small trees, the foliage or fruit of which it desires to eat. It is of a perfectly homogeneous structure (see HORNS), and solid.

The different species of R. display some differences of dentition. None of the species of R. displays a high degree of intelligence. Although usually harmless, they are easily provoked, and shew much capriciousness of temper. When irritated, they become very dangerous; and although usually slow in their movements, they can, upon occasion, run rapidly. Their great weight and strength enable them to force their way through jungles, breaking down the smaller trees before them. The hide is proof against the claws of the lion or tiger, and is not to be penetrated by a leaden bullet, except at a very short distance, or in some of the thinner parts about the neck and chest. Bullets of iron or tin are used for shooting them.

The species of R. agree in being found sometimes solitary or in pairs, sometimes in little companies, never in large herds.

The INDIAN R. (*R. Indicus*) is a native of the continental parts of the East Indies, and lives chiefly in marshy jungles on the banks of lakes and rivers, often wallowing in the mud, with which it encases itself, apparently as a protection against insects, which annoy it notwithstanding the thickness of its hide. It is the largest known species of R., a large specimen being rather more than five feet in height. The horn is sometimes 3 feet in length, and 18 inches in circumference at the base. The Indian R. was known by very imperfect description to the ancient Greeks, receiving the very inappropriate name of *Indian Ass*; and from accounts of it the fable of the unicorn probably originated. Individuals have from time to time been brought alive to Europe, and have proved tolerably quiet and tractable, feeding with apparent satisfaction on moistened hay, vegetables, pulse, grain, &c. The JAVANESE R. (*R. Javanicus*, or *R. Sondaicus*) is a somewhat smaller species, also one-horned. Sumatra has a two horned species (*R. Sumatrensis*). Different species of R., all two-horned, are found in almost all parts of Africa, and one or more of them were known to the ancient Romans. —The BOVILIT, or BLACK R. (*R. bicornis*, or *R. Africanus*), of South Africa, is the smallest of all the known species. It is of a black colour, and its first horn is rather thick than long, its second short and conical. It is a fierce and dangerous animal, capable of great activity, and more dreaded by the South African hunter than the lion itself.—The KEITLOA (*R. Keitloa*) is larger, and has the two horns nearly equal in length, the foremost horn curved backwards, the other curved forwards. It is also a native of South Africa, and much dreaded both on account of its strength and its ferocity. —The WHITE R. (*R. Simus*), or MUCHUCO, or MONOOHO, is the largest of the well-ascertained African species.

No species of R. is prolific. One young one only is produced at a birth, and the intervals are long. The flesh of the R. is used for food. That of the different species is somewhat variously esteemed. The skin is used in the East Indies for shields; in South Africa, it is sliced up into thongs.

The earliest remains of the R. are found in Miocene strata, and in the subsequent Tertiary deposits they frequently occur. Ten species have been described. A two-horned species was found by Pallas in the frozen gravel of Siberia, along with the mammoth, still covered with a shaggy coat of long wool, and having its flesh preserved.

RHINOPLA'STIC OPERATION. When a portion or the whole of the nose has been destroyed by accident or disease, the deficiency may be restored by a transplantation of skin from an adjoining healthy part. When the whole nose has to be replaced, the following course is usually adopted. A triangular piece of leather is cut into the shape of the nose, and is extended on the forehead with its base uppermost; its boundaries, when thus flattened, are marked out on the skin with ink. Any remains of the old nose are then pared away, and a deep groove is cut round the

margins of the nasal apertures. When the bleeding from these incisions has stopped, the marked portion of the skin of the forehead must be carefully dissected away, till it hangs by a narrow strip between the eyebrows. When the bleeding from the forehead ceases, the flap must be twisted on itself, so that the surface which was originally external may remain external in the new position, and its edges must be fastened with stitches into the grooves prepared for their reception. The nose thus made, is to be supported with oiled lint, and well wrapped in flannel, to keep up the temperature. When complete adhesion has taken place, the twisted strip of skin may be cut through, or a little slip may be cut out of it, so that the surface may be uniformly smooth. When only a part of the nose, as one side only, or the septum, requires to be restored, modifications of the above operation are required, and the skin, instead of being taken from the forehead, is taken from the cheek or the upper lip. For further details regarding this important operation, the reader is referred to Fergusson's *Practical Surgery*.

This operation is popularly known as the *Taliacotian Operation*, from its having been first performed by Taliacotius, who was professor of anatomy and surgery at Bologna, where he died in 1553. The work in which the operation is described was not published for more than forty years after his death. It appeared in 1597, under the title *De Curtorum Chirurgia per Insitionem libri duo.* Instead of taking the skin for the new nose from the forehead, he took it from the arm of his patient, and there is no reason why the operation which he describes, although inferior in many respects to that at present adopted, should not be successful. The difficulty of keeping the arm sufficiently long in apposition with the face (a period of about twenty days), was doubtless one of the reasons for selecting the forehead in preference as the part from which to take the skin. The name of Taliacotius has been mainly popularised in this country by a well-known coarse joke in Butler's *Hudibras*. There is, however, little foundation for the view which Butler takes of the operation. Taliacotius discusses the advantages and disadvantages of taking the skin from the *arm* (he does not suggest any other part of the body) of another person, but he comes to the conclusion, that it would be impossible to keep two persons so fastened together for the necessary time, that no motion of the parts in apposition should occur, and he adds, that he never heard of the plan being attempted. It is almost unnecessary to add, that even if a nose were manufactured from the skin of a second person, there is not the slightest reason for apprehending that it would suddenly die and drop off on the death of the original proprietor of the skin, notwithstanding the cases to the contrary recorded, as illustrative of the power of sympathy, by Van Helmont, Campanella, Sir Kenelm Digby, and others. This astounding notion was resuscitated two or three years ago by M. Edmund About in a popular novel, entitled *Le Nez d'un Notaire.*

RHIPI'PTERA. See STREPSIPTERA.

RHIZA'NTHEÆ (RHIZOGENS of Lindley) are a very remarkable natural order of plants. They are parasitical plants, brown, yellow, or purple, never of a green colour, destitute of true leaves, and having cellular scales instead. The stem is amorphous and fungus-like; sometimes, as in Rafflesia (q. v.), there is no stem; but the flowers arise immediately from the surface of the branch or stem to which the plant is parasitically attached. Spiral vessels are either few or wanting, and the substance is chiefly cellular tissue. Whilst their general structure thus associates them with fungi, which they resemble also in their mode of decay, they have the flowers and sexual organs of phanerogamous plants. The flowers are monœcious, diœcious, or hermaphrodite. Lindley regards these plants as forming a class distinct from the other Phanerogamous plants (*Exogens* and *Endogens*), and as one of the connecting links between them and the Cryptogamous plants (*Thallogens* and *Acrogens*). There are not many more than 50 known species in all, of which one or two are found in the south of Europe, the others in Africa and the warmer parts of Asia and America. *Cynomorium coccineum* (*Balanophoraceæ*) is found in Malta, and is the *Fungus Melitensis* of apothecaries, long celebrated for arresting hæmorrhages. Others are likewise used as styptics. *Cytinus hypocistis* (*Cytinaceæ*) grows on the roots of species of Cistus in the south of Europe. Its extract (*Succus hypocistidis*) is used as an astringent in hæmorrhages and dysentery. A species of *Ombrophytum* (*Balanophoraceæ*) springs up suddenly after rain in Peru, like a fungus, is insipid, and is cooked and eaten under the name of *Mays del Monte.* Different species of *Balanophora* are very abundant in Northern India. They are found in the Himalaya at an elevation of 10,000 feet, producing great knots on the roots of maple trees, oaks, &c., which are sought after by the Tibetans, and carried into Tibet, where they are made into very beautiful cups.

RHIZO'PODA (Gr. *rhiza*, a root, and *poda*, feet), an important class of the lowest of the animal subkingdoms, the Protozoa. In all the organisms of this class, the body is composed of a simple gelatinous substance, to which the term 'sarcode' is applied; and in all, locomotion is performed by the protrusion of processes which, from their function, are termed 'pseudopodia,' or false feet. As in the case of all the Protozoa, except the Infusoria, there is no mouth or intestinal tube.

As a typical form of rhizopod, the *Amœba* (fig. 1), a minute animal readily obtained in this country, may be taken. On placing one of these organisms (obtained from a pond, or from a bottle containing some vegetable infusion) under the microscope, it is seen to resemble a roundish mass of semi-transparent jelly, altogether devoid of life. Soon, however, the animal begins to push out in various directions portions of the gelatinous mass of which it consists, and by the alternate expansion and retraction of these prolongations, it effects a slow and somewhat irregular locomotion. Should these processes come in contact with anything fit for food, they grasp it and coalesce around it, and the morsel soon becomes enclosed in the interior of the body, much as (to use an illustration employed by Professor Greene in his *Manual of the Protozoa*) a stone may be forced into the interior of a lump of clay, or similar plastic material. When all that is nourishing is absorbed,

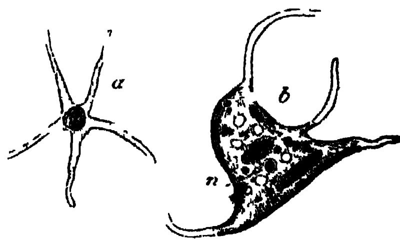


Fig. 1.—Amœba Radiosa.
a, young *Amœba*, with five pseudopodia protruded; *b*, another specimen.

the indigestible remains are ejected through some part of the body. A nucleus may generally be observed, and at times (but not permanently) one or more clear vesicles may be noticed, containing a fluid which is apparently furnished during the process of digestion. The members of the genus *Amœba* (containing at least three species) may be regarded as representing the simplest forms of animal life. Closely allied to the *Amœba* is the *Actinophrys*, or Sun-animalcule (fig. 2), and both these genera

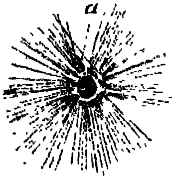


Fig. 2.—Sun-animalcule in the act of feeding:



Fig. 3.—Difflugia proteiformis.



Fig. 4. Ascella acuminata.

At *a* is seen a captured Infusorius entering the substance of the body.

are completely naked. In *Difflugia* (fig. 3), the 'sarcode' is invested with a membranous oval coat with an aperture at one end, from which the pseudopodia project. In *Ascella* (fig. 4) the soft parts are protected by a discoid, or hemispherical shield, open below; while in the *Foraminifera* (q. v.),

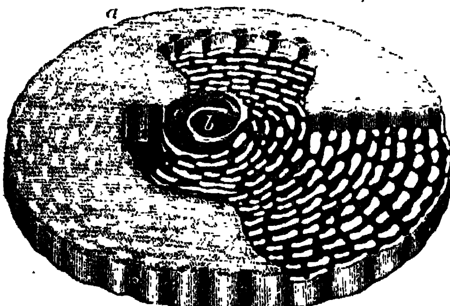


Fig. 5.—Structure of Orbitolites complanatus:

a, simple disc of *Orbitolites* laid open to shew its interior; *b*, central cell; *c*, circumambient shell, surrounded by concentric zones of shells connected with each other by annular and radiating passages.

the soft part is invested with a calcareous shell, which is sometimes simple, but more commonly consists of an agglomeration of minute chambers (fig. 5).

Various classifications of the Rhizopods have been proposed by different zoologists. That of Greene, in which they are simply divided into *Amœbea* and *Foraminifera*, is sufficient for all practical purposes. All the *Amœbea* are microscopic, and seldom exceed $\frac{1}{50}$th of an inch in diameter. The *Foraminifera* (q. v.) are somewhat larger.

Amongst the most important contributions to our knowledge of this department of the animal kingdom must be mentioned: Schultze, *Ueber den Organismus der Polythalamien*, 1854; Williamson, *On the Recent Foraminifera of Great Britain*, 1858; Claparede et Lachmann, *Etudes sur les Infusoires et les Rhizopodes*, 1858—1860; Carpenter, *Introduction to the Study of the Foraminifera*, 1861; and Hackel, *Die Radiolarien*, 1862.

RHODE ISLAND, one of the thirteen original United States of America, and the smallest in the Union, on the southern coast of New England, is 47½ miles from north to south, and 40 miles from east to west; and has an area of 1046 sq. miles. It is bounded N. and E. by Massachusetts, S. by the Atlantic, and W. by Connecticut. It is divided into five counties, and its principal towns are Providence and Newport, the twin capitals; Bristol, Warren, Pawtucket, Woonsocket, &c. Narraganset Bay, which occupies the south-eastern quarter of the state, is from 3 to 12 miles wide, and filled with beautiful islands, the largest of which, Rhode Island, is 15 miles long, by 3 to 3½ wide, and contains the town of Newport, a fashionable summer resort, with a large and spacious harbour, and formidable fortifications. Several small rivers, as the Pawtucket, Pawtuxet, Pawcatuck, &c., rising in the hills of Massachusetts, flow into Narraganset Bay, and their frequent falls afford water-power to numerous manufacturing villages. The country is hilly, and the soil rough and stony, and chiefly devoted to pasturage and orchards. The formation is chiefly of primary stratified and unstratified rocks, with some coal of a poor quality, iron, limestone, and marble. The climate is mild, and on the islands delightful. The population is chiefly engaged in trade and manufactures. There are in the state 147 cotton, 68 woollen, 33 iron factories; and a large coasting-trade, and considerable fisheries are carried on. Five railways, and several steamboat lines, connect the chief towns with Massachusetts, Connecticut, and New York. There are 90 banks and insurance companies, 4 daily and 17 weekly newspapers, 240 churches, 400 school-houses, a grammar-school, Brown University, and state penitentiary and asylums (see PROVIDENCE). The government, which existed until 1842 under the charter given to Roger Williams in 1642, is similar to that of the other states. The governor has a salary of 1000 dollars, or about £200, and the lieutenant-governor 250 dollars, or £50 per annum. R. I. is believed to have been the Vinland of the Norsemen, who explored this coast in the 10th century. It was settled in 1636 by Roger Williams and his companions, Baptists, who were expelled for their religious opinions from the Puritan colony of Plymouth. The colony suffered from the Indian wars, until the defeat and death of Philip, king of the Wampanoags. There still exists a remnant of over 150 of the Narragansets, of mixed blood, who have a church and school. Pop. in 1820, 83,059; 1840, 108,830; 1860, 174,621.

RHODES, an island, now belonging to Asiatic Turkey, and long an important, wealthy, and independent state of ancient Greece, in the Mediterranean, lies off the south-west coast of Anatolia, from the nearest point of which it is distant about 10 miles. It is 46 miles long, and 18 miles in greatest breadth, and is traversed in the direction of its length—from north to south—by a chain of mountains, which rise in Mount Atairo (the former *Atabyris*, in ancient times crowned by a temple of Jupiter) to the height of 4560 feet. Pop. about 34,000, of whom 10,000 are Turks, and the remainder chiefly Greeks. The mountains are covered with forests, the valleys are fertile, and the well-watered plains form rich and beautiful pasture-lands. Of all the islands in the Levant, R. possesses the most beautiful and the most temperate climate. The vines and olives yield abundantly, and rich harvests of grain, tobacco, and delicate fruits are obtained. Valonea, sponges, wine, and fruits are the chief articles of export. The harbours of R. are in a wretched condition. In 1863, 515 vessels of 147,124 tons entered and cleared the ports. The imports for the same year amounted to £152,000, the exports to £77,000.

R., the ancient *Rhodos*, was inhabited at a very early period. The Telchines, who are asserted by tradition to have been its most ancient inhabitants, are said to have migrated hither from Crete. It was not, however, until the immigration of a branch of the Doric race that the distinctive national character of the Rhodians became fixed. The first immigration of Dorians seems to have taken place before the Trojan war, for R. is said to have sent nine ships to Troy under the leadership of the Heracleid Tlepolemus. Situated between the three ancient continents, a position highly favourable to the development of commercial enterprise, the Rhodians at an early period rose to great prosperity and affluence. Their three most ancient towns were Lindus, Ialysus, and Camirus, and they planted numerous colonies not only on the shores in their vicinity, but also on the coasts of Lycia, Italy, Sicily, and Spain. At the end of the 5th c. B.C., they founded the city of Rhodes (q. v.): and after this event, the history of the island is comprised in that of the city.

RHODES, an ancient and famous maritime city, capital of the island of the same name, and situated on the north-east extremity of that island. Lat. of harbour 36° 26′ N., long. 28° 16′ E. The modern city, though scarcely one-fourth the size of the former one, has an imposing appearance. Its site is admirable, and it rises in the form of an amphitheatre behind the fortified harbours, of which there are two, separated from each other by a narrow quay. At the entrance to the harbours stand the two quadrangular towers of St John and St Michael. The harbours, however, are now neglected [illegible] once flourishing mart of the L[illegible], and this [illegible] is now compara- [illegible] stances not at all understood, [illegible] the seat of industry or active commerce. The town, overlooked by mosques and minarets, consists of ill-built houses and gloomy streets. The earthquakes of 1851, of 1856, and of 1863, as well as the frightful powder-explosion in 1856, caused by a flash of lightning, did much to devastate the town. By the powder explosion, the church of St John, built in 1500, and the great tower of the Knights of St John, were shattered, together with 300 houses, under the ruins of which 1000 townspeople lost their lives; and by the earthquake of 1863, 2000 houses were destroyed, and many lives lost. The palace of the Grand Master is now in ruins, and the hospital of the knights now serves as a granary. Pop. about 20,000.

The city of R. was founded in 408 B.C., and was built on a regular plan, the unity and harmony of its architecture being secured by the circumstance, that the design of the whole was the work of one man. It was girt about by strong walls, surmounted by towers, and was provided with two excellent harbours. But it was remarkable for the number and excellence of its paintings, sculptures, and statues, as well as for the beauty and strength of its architecture. At the entrance of one of its ports stood a gigantic brazen statue of Helios, 70 cubits in height, and called the Colossus of Rhodes. Besides this statue, which is described as one of the seven wonders of the ancient world, 3000 others, of which 100 were colossal, adorned the city. The capital of a fertile and flourishing island, and the great centre of the commerce of the Mediterranean, R. long enjoyed great prosperity. The arts were also prosecuted with assiduity, and intellectual activity manifested itself here long after it had declined in most parts of Greece. From the outbreak of the Peloponnesian War to the middle of the 4th c. B.C., R. was alternately in league with Athens and in arms against that city. Like the rest of Greece, it submitted to the victorious Alexander, and received a Macedonian garrison; but on the death of Alexander, 323 B.C. the Rhodians rose upon and expelled the intruders. From this time to the overthrow of the Macedonian monarchy, R. largely extended its territories, and rose to great commercial and naval importance. After the death of Cæsar, whose side the Rhodians had taken against Pompey in the civil war, they were defeated in a naval engagement by Cassius, who, in 42 B.C. entered the city by force, massacred the hostile leaders, seized the public property, and rifled the temples. This visitation broke the power of R., but it long continued to maintain its *prestige* as a seat of learning. During several centuries, R. remained in the power of the Greek emperors. In 1310, the Grand Master of the Knights of St John of Jerusalem settled here, and here the brethren remained till the 16th century. (See JOHN, ST, KNIGHTS OF.) Since this period, R. has remained a possession of Turkey.

RHO'DIAN LAW is the earliest system of marine law known to history, said to be compiled by the Rhodians after they had by their commerce and naval victories obtained the sovereignty of the sea, about 900 years before the Christian era. Cicero refers to the Rhodians as illustrious for their naval discipline. The collection of marine institutions [illegible] Rhodian [illegible] is to be found in Vinnius, but their authenticity is doubted. Some say that the Romans adopted these laws during the first Punic war, others say that Justinian incorporated them with the Roman law. The leading points supposed to be borrowed from the Rhodian law relate to the shares of the officers and crew of a ship, the punishment of barratry and of plundering wrecks, and compensation payable to the heirs of mariners who lost their lives in the service of the vessel.

RHO'DIUM (symb. R, Rh, and Ro, according to different chemists; equiv. 52; spec. grav. 12·1) is one of the metals of the platinum group. It is a white, very hard metal, resembling aluminium rather than silver. It fuses less easily than platinum. It is ductile and malleable when pure and after fusion, and insoluble in all acids; but when alloyed in small quantity with platinum, copper, bismuth, or lead, it dissolves with them in *aqua regia*. It usually forms about one-half per cent. of the ore of platinum, from which it is extracted by a complicated process, for details of which we must refer to Deville and Debray's 'Memoir on Platinum and its Ores,' in the *Annales de Chimie et de Physique* for 1859. Two oxides, two sulphides, and three chlorides of rhodium have been obtained and examined by chemists. The sesquichloride unites with several soluble chlorides to form crystallisable double salts, which are of a rose colour (whence the name rhodium, from the Gr. *rhodon*, a rose). An alloy of steel, with a small quantity of rhodium, is said to possess extremely valuable properties; and according to Deville, an alloy of 30 or more parts of rhodium with 70 of platinum, is easily worked, and is not attacked by aqua regia, and hence it forms an excellent material for crucibles. This metal was discovered in 1803 by Wollaston.

RHODODE'NDRON (Gr. rose-tree), a genus of trees and shrubs of the natural order *Ericeæ*, having ten stamens, a very small calyx, a bell-shaped or somewhat funnel-shaped corolla, and a capsule splitting up through the dissepiments. The buds in this and nearly allied genera, as *Azalea* (q. v.), are scaly and conical. The species are numerous; they have evergreen leaves, and many of them are of great beauty both in foliage and in flowers. A few small species are natives of Continental Europe and of Siberia; but the greater number belong to the temperate parts of North America, and to

the mountains of India. *R. maximum*, so designated when the far larger Indian species were unknown, is common in Britain as an ornamental shrub It is a large shrub or small tree, which forms impenetrable thickets on many parts of the Alleghany Mountains, and has a magnificent appearance when in flower The leaves are large, oblong, acute, stalked, leathery, dark green and shining above, rusty brown beneath The flowers are large, in umbellate corymbs, varying in colour from pale carmine to lilac This species is quite hardy in Britain, as is also *R ponticum* a very similar species, with narrower and more pointed leaves, which are of the same colour on both sides, a native of Western Asia, and apparently also of the south of Spain *R Catawbiense* a native of the southern parts of the Alleghanies, with large purple flowers, *R Caucasicum*, the name of which indicates its origin, and *R arboreum* a native of Nepaul with very dense heads of large scarlet flowers and leaves 4—6 inches long attaining in its native country a height of 30 or 40 feet are also fine species and well known Most of the extremely numerous varieties now common in our gardens and shrubberies have been produced from them by hybridising or otherwise. Many splendid species of R have recently been discovered in the [illegible] the Khasia [illegible] and other mountainous parts of India by Dr Hooker and others, and some of them have begun to be introduced into cultivation in Europe It is impossible for us to notice more than a few *R Falconeri* is described as in foliage the most superb of all, the leaves being 18 or 19 inches long It is a tree 30—50 feet high, with leaves only at the extremities of the branches It grows in Eastern Nepaul at an altitude of 10,000 feet *R argenteum* has flowers 5½ inches long and equally broad clustered, and very beautiful *R Maddeni R Dalhousiae, R Edgeworthii* and others, have white flowers *R Dalhousiae* is remarkable as an epiphyte growing on magnolias laurels and oaks It is a bushy shrub, bearing from three to six white lemon scented bells 4½ inches long at the end of each branch *R Nuttalii* has fragrant white flowers, said to be larger than those of any other rhododendron All these belong to the Himalaya In mountains further in latitude as on the Neilgherry Hills and on the mountains of Ceylon, *R nobile* prevails a tree of 50—70 feet high every branch covered with a blaze of crimson flowers —*R Keysii* and *R Wallichii*, also natives of the north of India have flowers with nearly tubular corolla.—*R ferrugineum* and *R hirsutum* are small species, shrubs from one to three feet in height, natives of the Alps, and among the finest ornaments of alpine scenery They are called *Alpenrose* (Alpine Rose) by the Germans They are not easily cultivated in gardens They have small carmine coloured flowers in umbellate clusters The mountain slopes glow with their blossoms in July and August The flora of the Himalaya contains a number of similar small species *R anthopogon* and *R setosum*, dwarf shrubs with strongly scented leaves, clothe the mountains in Eastern Nepaul at an elevation of 12,000 feet and upwards, with a green mantle, brilliant with flowers in summer *R nivale* is the most alpine of woody plants, spreading its small woody branches close to the ground, at an elevation of 17,000 feet in Sikkim *R Lapponicum*, a procumbent shrub, with small flowers, grows as far north as human settlements have reached in Europe, Asia, and America Some of the species of this genus possess narcotic properties An oil obtained from the buds of *R ferrugineum* and *R hirsutum* is used by the inhabitants of the Alps, under the name *Olio di Marmotta*, as a remedy for pains in the joints, gout, and stone. *R. chrysanthum*, a low shrub, with golden yellow flowers, native of Siberia, is also used in gout and rheumatism *R. cinnabarinum* a Himalayan species, poisons goats which feed upon it, and when used for fuel, causes inflammation of the face and eyes. But the flowers of *R. arboreum* are eaten in India, and Europeans make a pleasant jelly of them.

RHOMBUS See PARALLELOGRAM

RHONE (*Rhodanus* of the Romans), which takes its rise in the Swiss Alps, on the western side of Mount St Gothard, not far from the sources of the Rhine is the only important French river which falls into the Mediterranean Its entire length, from its origin to the Gulf of Lyon at its embouchures, is 644 miles, and the area of its river basin 28,000 sq miles The R is, for its length, probably the most rapid river in the world On issuing from its source it runs in a south westerly direction through the canton of Valais and after being swelled in its rapid course by the afflux of several tributaries, it takes a sudden turn to the north near Martigny, and throws its waters into the Lake of Geneva (q v) After issuing from the lake it takes up the turbid stream of the Arve, and in continuing its passage through a rocky gorge of the Jura chain disappears below the rocks near Fort l'Ecluse for a length of 300 feet forming the subterranean channel known as the *Perte du Rhone* At St Genis the R enters a less mountainous district and passing beyond the Jura district flows through a low valley to the [illegible] where it receives the Saone From Lyon it [illegible] in a southern direction past Vienne, Valence, [illegible] Avignon and Arles, bifurcating near [illegible] into two main streams, the [illegible] the Great and the [illegible] Rhone, which enclose the [illegible] known as the Ile de la Camargue and finally merge their waters with those of the Mediterranean. The most important affluents of the R are, on the right the Ain Saone Doubs, Ardèche and Gard, on the left the Arve Isère Drôme, and Durance. From Lyon southward the R is easily navigable for [illegible] vessels but the up navigation owing to the rapid fall of the stream and the sudden shifting of sandbanks is attended with considerable difficulty and is at times almost impracticable On account of the sand other obstructions, which are great at the mouths of the river, the communication with the Mediterranean is chiefly effected by means of canals, which, communicating with several shore lakes as l'Etang de Berre and others open a passage between the sea at Port du Bouc and the river at Arles, and thus obviate the necessity of navigating round the delta. In its upper and middle course, the R presents beautiful and varied scenery, enriched with a luxuriant southern vegetation, including grapes of superior quality, from which some of the finest wines of France are obtained, but below Avignon, it passes through a broad arid tract of country, and is bounded by swampy banks The great natural commercial advantages of the R have been considerably extended by means of numerous canals, which, by joining it to the Seine, the Loire, and the Rhine have connected it with the Atlantic and the German Ocean

RHONE, a small but important inland department of France, bounded on the N, W., and S. by the departments of Saône et Loire and Loire; area, 1077 sq m, pop (1862) 662,493. It lies almost wholly in the basin of the Rhone, and its great affluent the Saône, its eastern boundary is formed by these rivers. The surface is almost entirely mountainous or hilly. Of the 689,536 acres, more than one-half is under tillage. The principal productions are vines and mulberry-trees,

The wines are famous for their excellent quality. Of the Mâcon wines, grown in the north, in the former district of Beaujolais, the best are the fine red wines of Chenas; of those grown in the south of the department, called the *vins du Rhone*, the finest are the red wines of Côte Rôtie and the white wines of Condrieu. About 75,000 acres are in vineyards, and the amount of wine made annually is about 17,000,000 gallons. Silks (see LYON) are manufactured extensively, and numerous other branches of manufacture are actively carried on. The industries of the department are mentioned under the names of the towns. The department is divided into the two arrondissements of Lyon and Villefranche. Capital, Lyon (q. v.).

RHONE, BOUCHES DU. See BOUCHES-DU-RHONE.

RHU'BARB (*Rheum*), a genus of plants of the natural order *Polygoneæ*, closely allied to *Rumex* (dock and sorrel), from which it differs in having nine stamens, three shield-like stigmas, and a three-winged achenium. The species, which are numerous, are large herbaceous plants, natives of the central regions of Asia, with strong, branching, almost fleshy roots; erect, thick, branching stems, sometimes 6 or 8 feet high; the stems and branches whilst in the bud covered with large membranous sheaths. The leaves are large, stalked, entire or lobed; the flowers are small, whitish or red, generally very numerous, in large loose panicles of many-flowered clusters. The roots are medicinal; but those of different species seem to possess their medicinal properties in very different degrees, or these properties are developed very variously in different soils and climates, or according to other circumstances not at all understood. It is not known what species of R. yields the valued R. of commerce, which comes from inland parts of China or Chinese Tartary. Some of it reaches Europe by way of Canton, but the best is brought through Russia. It is commonly known, however, in Britain as *Turkey R.*, because it was formerly brought by way of Natolia. It is carefully examined at Kiachta by persons appointed by the Russian government, so that the superior quality of all that is permitted to enter the European market is secured. R. is sometimes cultivated for its root in Europe, but the produce, *French R.* and *English R.*, is very inferior to the R. of the East, which it is often employed to adulterate. About 12 acres are devoted to the cultivation of R. for its root near Banbury, in England, the species cultivated being *Rheum rhaponticum*; but in France, besides this species, *R. undulatum* and *R. compactum* are employed. At Banbury, the roots are taken up when three or four years old, and dried in drying houses by a carefully regulated heat.

The leaf-stalks of R. contain an agreeable mixture of citric and malic acids, and when young and tender, are much used, like apples, for tarts or pies, and also for making a kind of preserve. For these purposes, different kinds of R. are now very extensively cultivated in Britain, and in other temperate and cold countries, although it is only since the beginning of the present century that this valuable addition has been made to the plants of our kitchen-gardens; the species previously introduced having been cultivated merely as objects of curiosity, or for the sake of their roots. A number of species have been introduced into cultivation for their leaf-stalks. *R. palmatum*, the first species known, and which was once believed to yield the Turkey R., has roundish green leaf-stalks and half-palmate leaves, with pinnatifid pointed lobes. Its stalks are very inferior to every other kind in our gardens both in size and quality, and the appearance of the leaf is very different. The other cultivated kinds, *R. undulatum*, *R. rhaponticum*, and *R. hybridum*, with endless varieties produced by the art of the gardener, all have broad, heart-shaped, undivided leaves, and the leaf-stalks flattened and grooved on the upper side. The leaf-stalks are often also of a reddish colour, which in some of the finest varieties pervades their whole flesh. R. is propagated by seed, and the plants yield a crop in the second or third year, or by dividing the roots. It prefers a light rich soil; and the ground ought to be heavily manured every year. The plants are placed 3 or 4 feet apart, according to the size of the variety. The varieties which, by excessive manuring, are made to produce the most gigantic stalks, are not nearly so good in quality as the smaller kinds. R. is cultivated on a most extensive scale by market-gardeners. It is forced in winter and early spring by being placed in pots within houses, or by having pots inverted over it, and dung and straw heaped around; and forced R. is more tender and delicate than that which grows in open air.

There are few subjects in the materia medica which are so enveloped in obscurity as rhubarb. Even the period of its introduction into medicine is uncertain, for the description given by Dioscorides of the drug which he designates *Rheon* does not correspond with our rhubarb. It was probably introduced into Europe by the Arabian physicians, somewhat previous to the time of Avicenna, in whose writings the term *Rawend* occurs—a name still used, with a slight alteration, for R. by the Persians and Hindus. In the British Pharmacopœia, no attempt is made to determine the species of *Rheum* used in medicine, and there can be no doubt that the roots of several species are usually to be found in the drug market. According to the Pharmacopœia, the root, deprived of its bark, is imported from 'Chinese Tibet and Tartary.' Little is known of the chemical composition of R. root, further than that it yields a yellow colouring matter termed *Rhein* ($C_{20}H_8O_6$?), which is sparingly soluble in water, but dissolves freely in the alkalies, producing a reddish-brown liquid, from which the rhein may be precipitated in flakes on the addition of acetic acid. R. is very liable to adulteration; and if the adulterated R. be in a state of powder, the detection of the fraud is very difficult.

R. may be briefly described as a cathartic, an astringent, and a tonic. As a cathartic, it chiefly operates by increasing the muscular action of the intestines; and when the cathartic action is over, there is generally more or less constipation, arising, as is usually supposed, from the astringent action then coming into play. The appetite is also improved, and the digestive process rendered more active, by the action of this drug. It must not be forgotten that the colouring matter of R. passes into the serum of the blood and the secretions; and urine rendered red by its absorption has not unfrequently been confounded with bloody urine by practitioners ignorant of the very different chemical reactions of rhein and the colouring matter of blood.

R. is one of the best aperients for general use in infancy, in consequence of the certainty of its action, and of its tonic and astringent properties, which are of much importance in the treatment of many infantile diseases, attended with imperfect digestion and irritation of the intestinal canal. In adults, it is serviceable in chronic diarrhœa and dysentery, when it is expedient to clean out the bowels. It is also a useful aperient in convalescence from exhausting disease, as being free from the risk of overacting; and for the same reason, it is a

useful medicine for persons who are constitutionally liable to over-purgation from trivial causes.

The officinal preparations are the *Pulvis Rhei Compositus* (composed of powdered R., magnesia, and ginger, and popularly known as Gregory's Powder or Mixture—the average dose being a teaspoonful), the *Pilula Rhei Composita* (a compound R. pill, composed of R., aloes, myrrh, hard soap, oil of peppermint, and treacle—the dose, as an aperient, being ten or fifteen grains), the *Extractum Rhei* (dose from five to ten grains), the *Infusum Rhei* (dose from two to four fluid ounces), and the *Tinctura Rhei*, which is usually given in doses of about a drachm, in association with other aperients.

RHUMB, or RHOMB (Lat. *rhombus*), a term introduced, according to Vitalis, into navigation by the Portuguese, and signifying at first a meridian, or especially the principal meridian of a map. It then came to signify any vertical circle, whether a meridian or not, and hence any point of the compass. A ship is therefore said to sail on a rhumb when its head is kept constantly directed to the same point of the compass. The rhumb-line thus crosses all meridians at the same angle, and corresponds exactly to what is known as the *Loxodromic Lines* (q. v.). In Mercator's chart, the rhumb line is a straight line (though not so in nature); but it must be carefully noticed that equal portions of it on the chart do not indicate equal distances on the surface of the globe, the divisions which are lowest in latitude always representing the greatest distance, and *vice versâ*.

RHYME. See RHIME.

RHYMER, THOMAS THE, a name given to the earliest poet of Scotland. The history of his life and writings is involved in much obscurity; but it is generally believed that Thomas Learmount of Ercildoune was the person whose poems and prophecies were extensively known among the people of Scotland at an early period. The R. derived his territorial appellation from the village of Ercildoune, in the county of Berwick, situated on the river Leader, about two miles above its junction with the Tweed. The time of his birth is unknown; but he appears to have reached the height of his reputation in 1283, when he is said to have predicted the death of Alexander III., king of Scotland. This singular prophecy is recorded in the *Scotichronicon* of Fordun in 1430, who relates that one day the R., when visiting at the castle of Dunbar, was interrogated by the Earl of March, in a jocular manner, if to-morrow should produce any remarkable event. The R. is reported to have expressed himself to the effect: 'Alas for to-morrow, a day of calamity and misery! Before the twelfth hour shall be heard a blast so vehement that it shall exceed all those which have yet been heard in Scotland—a blast which shall strike the nations with amazement, shall confound those who hear it, shall humble what is lofty, and what is unbending shall level with the ground.' On the following day, the earl, who had been unable to discover any unusual appearance in the weather, when seating himself at table observed the hand of the dial to point to the hour of noon; while, at the same moment, a messenger appeared bringing the mournful tidings of the accidental death of Alexander at Kingorn.

From this and other prophecies, the R. became popularly known as 'True Thomas,' and was believed to have derived his skill from his intercourse with the queen of Fairyland. The legend bears that he was carried off at an early age to Fairyland, where he acquired all the knowledge which made him so famous. After seven years' residence there, he was permitted to return to the earth, to enlighten and astonish his countrymen by his prophetic powers, still remaining bound to return to his royal mistress when she should intimate her pleasure. Accordingly, while the R. was making merry with his friends in his tower at Ercildoune, a person came running in, and told, with marks of fear and astonishment, that a hart and hind had left the neighbouring forest, and were composedly and slowly parading the street of the village. The R. instantly rose, left his habitation, and followed the animals to the forest, whence he was never seen to return. The Eildon Tree, where he delivered his prophecies, no longer exists, but its site is marked by a large stone called the Eildon Tree Stone. A neighbouring rivulet takes the name of the Bogle (or goblin) Burn from the R.'s supernatural visitants.

The earliest edition of the prophecies of the R. was published in Edinburgh, by Waldegrave, in 1603; and another edition by Andro Hart in 1615 (reprinted by the Bannatyne Club).

Allusions to the R. occur in Wynton's *Chronicle*, Blind Harry's *Wallace*, and other ancient Scottish authors. In Bellenden's translation of Boece, printed in 1535, it is stated that 'this Thomas wes ane man of gret admiration to the pepil; and schew sindry thingis as thay fell, howbeit thay wer ay hid under obscure wourdis.' In the poems of Robert of Brunne, who flourished about 1303, there is an incidental notice that the R. had composed a version of the incomparable romance of *Sir Tristrem*. It was long a subject of inquiry to Scottish antiquaries where this literary treasure might exist; until a copy of it was discovered by Mr Ritson in the Auchinleck manuscript, preserved in the Advocates' Library, which was edited by Sir Walter Scott in 1804. The merits of this romance are of a very high order, and the R. must be regarded as having possessed a poetical genius superior to any of his contemporaries.

The time of the death of the R., like that of his birth, is a matter of conjecture; but he must have died before 1299, the date of a charter in which his son calls himself 'Filius et hæres Thomæ Rymour de Ercildon.'

RHYNCHONE'LLA, a genus of brachiopodous mollusca, characterised by its trigonal acutely-beaked shell, the dorsal valve of which is elevated in front, and depressed at the sides, and the ventral valve is flattened or hollowed along the centre. The genus is represented by two living species, the one from the icy seas of the north, and the other from New Zealand. The shells of both are black. No less than 250 species of fossil shells have been referred to the genus. They occur in all formations from the Lower Silurian upwards.

RHYNCHO'PHORA. See WEEVIL.

RHYNCHOPS. See SKIMMER.

RHYTHM (Gr. *rhythmos*, any motion, especially a regulated, recurring motion: hence, measured motion, time, number), in its widest sense, may be defined as measured or timed movement, regulated succession. It seems to be a necessity for man, if movements of any kind are to be sustained for a length of time, that some more or less strict law of interchange should regulate the succession of the parts. It is even believed that the ground of this necessity may be discovered in the structure and functions of the human body. See Bain, *The Senses and the Intellect*. More particularly, in order that a number of parts may constitute a whole, or, at all events, a pleasing whole, a certain relation or proportion must be felt to pervade them. When exemplified in the arrangement of matter into visible objects, as in sculpture, architecture, and other

plastic arts, rhythm is usually called *symmetry*. Rhythm applied to the movements of the body produces the *dance*. 'The rhythmical arrangement of sounds not articulated produces *music*, while from the like arrangement of articulate sounds, we get the cadences of *prose*, and the measures of *verse*. Verse may be defined as a succession of articulate sounds, regulated by a rhythm so definite that we can readily foresee the results which follow from its application. Rhythm is also met with in prose; but in the latter its range is so wide that we never can anticipate its flow, while the pleasure we derive from verse is founded on this very anticipation.'

The rhythm of verse is marked in various ways. In Sanscrit, Greek, and Latin, during their classic periods, *quantity*, or the regulated succession of long and short syllables, was the distinguishing mark of verse. In the languages descended from these three ancient tongues, as well as in all the other Aryan languages, the rhythm depends upon *accent*. See METRE. The recurrence of similar sounds, or *rhime*, is also used, along with accent, to render certain points of the rhythm more distinct, as well as to embellish it. See RHIME.

RHYTHM, in Music, the disposition of the notes of a musical composition in respect of time and measure. To rhythm, music is chiefly indebted for its order, perspicuity, intelligibility, and consequently its power and effect. The rhythmical value of a musical sound is the ratio which its duration bears to that of other sounds. See NOTE. A musical composition is made up of portions of equal rhythmic value, called *measures*, separated by vertical lines called bars, the length of the measure being indicated by a sign at the beginning of the movement. For the varieties of time and their signatures, see MUSIC. The first note in each measure is distinguished by a greater force or stress than the rest: that stress is called *accent*, and of the four measure-notes in common time the third has also a subordinate accent, as has the third measure-note in triple time. There is also an irregular or rhetorical accent in music called *emphasis*, which may be laid on any part of the measure, and whose use is regulated by taste and feeling.

RHY'THMICAL MENTAL DISEASES. Certain affections become aggravated or mitigated at particular hours; certain others appear in paroxysms, to a certain extent of regular duration and recurrence; and a third class is named quotidian, quartan, &c., from the precise and unvarying periods at which their access returns. The element of time, and of regular intervals of time, is chiefly characteristic of morbid conditions of the nervous system. In chorea and involuntary shrieking, singing, &c., a rhythm may often be detected, of which the patient is altogether unconscious. Not merely have movements of the eyelids and of the limbs presented a perfectly timed succession, but cases are recorded where the wild gesticulations and jactations of St Vitus's Dance have been regulated so as to correspond to popular airs. A person has been known to strike his breast with the hand for hours with the same exactitude as if measured by a time-piece. Those affected with Tarantism are prompted to dance by the sound of music; and their movements are determined, it is affirmed, not by volition, but by the cadences of the tunes played in their hearing. The victims of the dancing mania in the 15th c. were similarly affected. In many forms of insanity, there is seen a tendency to rhiming in words, as well as to rhythmical movements. A patient for three consecutive days vociferated incessantly words terminating in *-ation*.—Laycock, *Nervous Diseases of Women*, pp. 185, 314; Sauvage, *Nosologia Methodica*, tomus ii. p. 231; *Medical Critic, passim.*

RIAZA'N, a central government of Great Russia, extends south-east from the government of Moscow. Area, 16,221 sq. m.; pop. 1,405,650. The principal river is the Oka, which, after forming the boundary between the governments of Moscow and Tula, and part of the boundary between Moscow and R., flows south-east to the middle of the latter, then turning north, disappears across the border on the north-east. The Oka divides the government into two unequal parts, of which the northern is low in surface and sandy in soil, while the southern presents an elevated surface and a most fertile soil. The Don crosses the south-west part of R., but is not here navigable. The chief products are iron ores, limestone, wheat, oats, rye, millet, buckwheat, and vegetables. There are many remarkably good studs. Though the chief occupations are agriculture and horticulture, there are a number of important industrial establishments, as needle, cloth, and glass factories; cotton-mills, iron-works, tanneries, and soap and tallow works. Manufactured goods and corn are exported.

RIAZAN, a town of Great Russia, capital of the government of the same name, stands on a branch of the Oka, near its junction with that river, 130 miles south-east of Moscow. It was founded in 1208, became in 1487 the residence of the princes of Riazan, and was made chief town of the government of R. in 1778. The chief fragment of antiquity is the interesting old fort called the Kreml. There is a ferry here across the Oka, at which the products of the vicinity are shipped: 5,770,000 bushels of corn are exported annually. Pop. stated at 21,149.

RIB, in Architecture, a projecting band or moulding on an arched or flat ceiling. It is of universal use in all styles of Gothic architecture; the early Norman examples are simple square bands crossing the vault at right angles, the groins being plain angles. In early English, the groins and ridge are also ribbed, and all the ribs are moulded. The ribs and their mouldings are multiplied as the style advances, till the whole surface becomes covered with them in the Fan-tracery Vaults (q. v.). Plaster ceilings are sometimes elaborately ornamented with patterns formed by ribs, especially in the styles of the times of Elizabeth and James I.

RIBBON, in Heraldry, a diminutive of the ordinary called the Bend, of which it is one-eighth in width.

RIBBON. See SILK and SILKWORM.

RIBBON-FISH, the popular name of a family of acanthopterous fishes, called *Tæniidæ*, or, more properly, *Tænioidæ*, by naturalists (from *tænia*, a tape-worm), on account of their compressed and elongated form. Notwithstanding their peculiarity of form, they are nearly allied to the *Scomberidæ*, or Mackarel family. They are of very delicate structure, with naked and silvery skin, a long dorsal fin often uniting with the tail-fin, a small mouth, and a protractile snout. They are widely distributed from polar to tropical seas, but are nowhere found in abundance, being deep-sea fishes, and mere occasional visitants of the coasts. Owing to the delicacy of their frame, perfect specimens are seldom obtained. Species exist which are nine or ten feet long, not six inches high, and scarcely an inch thick. See BAND-FISH, DEALFISH, and GYMNETRUS.

RI'BBONISM, the name of a system of secret associations among the lower classes in Ireland, the objects of which have long been a subject of much suspicion and of considerable controversy. The

first origin of the associations known under this name is involved in much obscurity. From the middle of the last century, secret organisations, variously designated, but for the most part connected with agrarian discontent, have from time to time arisen in Ireland. The earliest of these appears to have been that of the Whiteboys, who appeared about the year 1759. Later in the century, the fierce and sanguinary strife to which the relaxation of some of the penal laws under which the Catholics had long suffered gave occasion in the north, and which resulted in the Protestant organisation already described under the head ORANGEMAN (q. v.), led to the Catholic counter-organisation known by the name of Defenders; but this association seems to have been for the time purely local, being confined to Armagh and the neighbouring counties, in which the violences of the Protestant party had originated. The severely repressive measures adopted by the government on the outbreak of the rebellion of 1798, and continued for several years, prevented any notable progress of the Catholic organisation; and when at length, about 1806, such an organisation was initiated, it was of necessity conducted with the utmost secrecy. The name by which the members of these associations were now known was 'Threshers.' They appeared chiefly in Sligo, Mayo, Leitrim, Longford, and Cavan; and it is worthy of note that one of their professed objects was to resist the payment of tithes, and even of the stipend commonly, although freely, paid to the Catholic priests by members of their congregations. The associations called (it is supposed from the badge worn by the members) by the name of Ribbon societies first appeared about 1808, and originated in Armagh, whence they spread to Down, Antrim, Tyrone, and Fermanagh. There can be no doubt that their real object was a combined action, partly for self-defence, partly also probably for directly antagonistic action against the now wide-spread and formidable Orange confederacy. Their operations from the first were for the most part limited to the counties, chiefly in the north and north-west, in which the Orange associations were sufficiently numerous to be formidable; nor do they appear at any time to have had a footing in the purely Catholic counties, where there were few or no Orangemen to be encountered. The secret associations of the other districts—the midland, southern, and south-eastern counties—as the 'Carders' in East and West Meath, in Roscommon, and part of Mayo; and the 'Shanavests' and 'Caravats' in Tipperary, Kilkenny, Cork, and Limerick, had little of the religious element in their organisation, being mainly due to discontents arising from alleged agrarian and social grievances.

The Ribbon association also, no doubt, addressed itself to the same agrarian and social grievances; but it is plain that its direct and immediate object was antagonism to the Orange confederation, to which, in some respects, it bore considerable resemblance, although it was deficient in that complete and wide-spread organisation which so remarkably distinguished the former body. The Ribbon association was divided, like the Orange, into lodges, and the members of each lodge were bound by a secret oath to 'be true to each other,' and 'to assist each other in all things lawful.' Stated meetings of the lodges were held, and small money contributions were exacted, both at entrance into the association, and on each occasion of meeting. The members, moreover, were known to each other by certain secret signs and pass-words, which were frequently changed, and some of the specimens of which were of a singularly absurd and ludicrous character. But there does not appear to have been anything like that complete and curious scheme of a 'Central Grand Lodge,' with its subordinate hierarchy of 'county,' 'district,' and 'private' lodges, which characterised the great rival confederation. A still more striking and important difference was in the class of men with which the Ribbon societies were recruited. They are proved to have consisted exclusively of the very lowest classes, the humbler peasantry, farm-servants, and operatives of the least intelligent class. No trace appears among them of what is so striking in the Orange Association—the co-operation, or even the countenance, of the gentry, the clergy, the commercial class, hardly even of the farming class, except a few of the sons of farmers of the lowest grade. On the contrary, an attempt which was made, in a committee of the House of Lords in 1839, to connect the Catholic clergy and the Catholics generally with the Ribbon association, proved a signal failure, as did also the attempt to shew that the objects of the association were the overthrow of British rule in Ireland; and it was proved that the Catholic clergy, from the first origin of these associations, have persistently opposed them, and employed all their influence, and even their spiritual authority, to deter their flocks from taking any part in them.

From the absence of all statistical information, and from the rude and illiterate material out of which alone these societies are formed, it is impossible to offer any estimate of their number or extent. That they still exist, becomes abundantly clear on every occasion of party-strife which arises in Ireland; but they appear to have been replaced in several parts of the country by newer associations, such as the 'Phenicians,' the 'Brotherhood of St Patrick,' and the 'Fenians,' an association which is said to possess large affiliations in America, and among the Irish population of the manufacturing towns of England and Scotland.

RIBEAUVILLE, a small manufacturing town of France in the department of Haut Rhin, pleasantly situated amid vineyards, 34 miles south-south-west of Strasbourg. Excellent wines are made, and cotton goods are manufactured. The town is overlooked by the Vosges Mountains, along the crests of which runs a wall or rampart, built of unhewn stones, without cement, and from eight to ten feet high. It is of unknown antiquity, and is called the *Heidenmauer*, or Pagan wall. Pop. (1862) 6162.

RIBERA, JOSE, called SPAGNOLETTO ('the Little Spaniard') was born at Xátiva, near Valencia, in 1588, and died at Naples in 1656 or 1659. He studied a few years with Francesco Ribalta, a Spanish painter of eminence, but resolved to visit Italy; and after working hard at Rome, and studying the greatest masterpieces in some other states, he went to Naples, where, attracted by the novelty and boldness of Caravaggio's style, he adopted it, and became the ablest painter among the *naturalisti*, or artists whose treatment of subjects was based on a vigorous and powerful, but generally coarse and vulgar representation of nature, in opposition to that formed on the study of conventional or academic rules. He settled in Naples, where he became court-painter, and executed numerous important commissions in that city; and it is there that his best works are to be seen. Salvator Rosa and Guercino are numbered among his pupils. He executed about eighteen or twenty etchings, all marked by force and freedom.

RIB-GRASS. See PLANTAGINEÆ.

RIBS are elastic arches of bone, which, with the vertebral column behind, and the sternum, or breast-bone in front, constitute the osseous part of the walls of the chest. In man, there are 12

ribs on each side. The first 7 are more directly connected through intervening cartilages with the sternum than the remainder, and hence they are

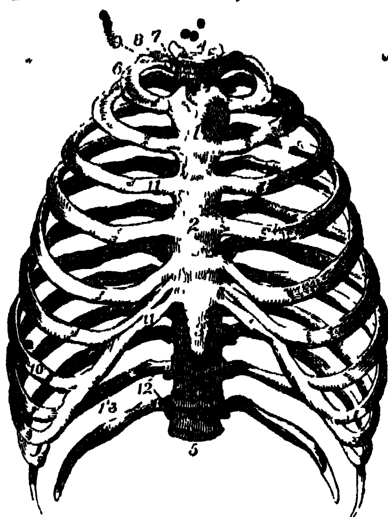


Fig. 1.—The Ribs, *in situ* :
1 and 2 are the upper and middle parts of the sternum or breast-bone; 3, its ensiform cartilage; 4, the first dorsal, and 5 the last (or twelfth) dorsal vertebra, 6, the first rib, 7, its head; 8, its neck, resting against the transverse process of the first dorsal vertebra, 9, its tubercle; 10, the seventh or last true rib; 11, The costal cartilages of the true ribs, 12, the last two false ribs or floating ribs; 13, the grooves along the lower border of the ribs (From Wilson's *Anatomist's Vade-Mecum*).

termed *vertebro-sternal* or *true* ribs; while the other 5 are known as *false ribs*, and the last two of these, from being quite free at their anterior extremities, are termed *floating ribs*. A glance at a skeleton, or

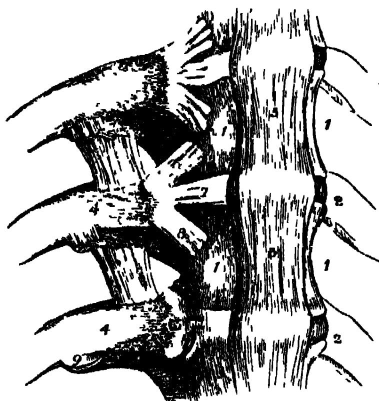


Fig. 2.—A Front View of the Articulations of the Ribs with the Spinal Column :
1,1, Dorsal vertebræ; 2, 2 intervertebral cartilages; 3, 3, the anterior common ligament, extending like a riband along the whole of the front of the vertebral column; 4, the neck, and 5 the head of rib, 6, 7, 8, three flat bundles of ligamentous fibres, radiating from the head of the rib to the adjacent vertebræ and intervertebral substances (they are removed in the lowest rib, seen in the figure), 9, the articulation between the tubercle of the ribs and the transverse vertebral process (From Gray's *Anatomy*).

at a plate representing the articulated bones, will shew that the ribs vary very considerably both in their direction and size. The upper ribs are nearly horizontal, but the others lie with the anterior extremity lower than the posterior; this obliquity increasing to the 9th rib, and then slightly decreasing. They increase in length from the first to the eighth, and then again diminish. The spaces between the ribs are termed the *intercostal spaces*. On examining a rib taken from about the middle of the series, we find that it presents two extremities (a posterior or vertebral, and an anterior or sternal), and an intervening portion, termed the body or shaft. The posterior extremity presents a head, a neck, and a tuberosity. The head is marked by two concave articular surfaces divided by a ridge, the lower facette being the larger. These surfaces fit into the cavity formed by the junction of two contiguous dorsal vertebræ, and the ridge serves for the attachment of a ligament. The neck is a flattened portion proceeding from the head; it is about an inch long, and terminates at an eminence termed the tuberosity or tubercle, from whence the shaft commences. On the lower surface of this tubercle is a small oval surface, which articulates (as shewn in figure 2) with a corresponding surface on the upper part of the transverse process of the lower of the two contiguous vertebræ. The shaft presents an external convex, and an internal concave surface. A little in front of the tubercle, the rib is bent inwards, and at the same time upwards, the point where this bending takes place being called the angle. The upper border of the rib is thick and rounded, while the lower border is marked by a deep groove, which lodges the intercostal vessels and nerve.

The ribs of Mammals are mostly connected, as in man, with the bodies of two vertebræ, and with the transverse processes of the posterior one. In the Monotremata, however, they articulate with the vertebral bodies only; while in the Cetacea, the posterior ribs hang down from the transverse processes alone. Their number, on each side, corresponds with that of the dorsal vertebræ. The greatest number, 23, occurs in the two-toed sloth, while in the Cheiroptera, 11 is the ordinary number. In Birds, each rib articulates by means of a small head with the body of a single vertebra near its anterior border, and with the corresponding transverse process by means of the tubercle. Moreover, each rib possesses a 'diverging appendage,' which projects backwards over the next rib, so as to increase the consolidation of the thoracic framework, necessary for flying. The dorsal vertebræ here never exceed 11, and are commonly 7 or 8 in number, and the ribs proceeding from them are connected with the sternum, not by cartilage, as in Mammals, but by true osseous sternal ribs, which are regularly articulated at one end with the sternum, and at the other with the termination of the spinal ribs. In the Chelonian Reptiles, the ribs (as well as the vertebra and the sternum) deviate remarkably from the normal type, the lateral parts of the carapace consisting mainly of anchylosed ribs united by dermal plates. In the Crocodiles, there are only twelve pair of true or dorsal ribs; while in the other Saurians, and in the Ophidians, the ribs are usually very numerous. In the Frogs, there are no true ribs; the reason probably being, that any bony element in their thoracic walls would interfere with the enormous thoracico-abdominal enlargement which these animals periodically undergo at the breeding period.

In the language of the transcendental anatomists, a rib is to be regarded as a *Pleurapophysis*—one of the elements of a typical Vertebra (q. v.).

RIBS, Fracture of the, is a very common surgical accident, resulting from blows or falls upon the chest. Ribs may, moreover, be broken by

mere pressure, as when persons are severely crushed in a crowd; and instances are on record in which, in the case of aged persons, the ribs have been actually fractured in violent coughing.

The treatment consists in the application of a broad flannel roller round the chest, so tightly as to prevent, as far as possible, all movement of the ribs, and to render the respiration abdominal rather than thoracic. The bandage must be prevented from falling by the addition of shoulder-straps; and in order to prevent the shoulder-blade from moving, and thus disturbing the broken ribs, some surgeons confine the arms to the side of the body. If one or both of the extremities of the fractured rib should perforate both the pleuræ, and wound the lung, air escapes in the act of inspiration from the lung into the pleural cavity, and from thence through the wound in the costal pleura into the cellular or areolar tissue of the trunk, giving rise to *emphysema*, in the form of a soft puffy tumour, that crepitates and disappears on pressure.

RICARDO, David, a political economist and statesman, was born in London on the 19th of April 1772. He was of Jewish extraction; and his father, who was a respectable member of the Stock Exchange, brought him up to his own business. There was an alienation between them on account of the son marrying out of the Jewish persuasion, and conforming to Christianity. Young R. practised in the Exchange until the year 1818, and whether from his own skill as a broker, or the favour extended to him on account of the position in which he was placed by his conformity, he realised a large fortune, preserving throughout his career in business an honourable reputation. While thus practically occupied, he was ardently working his way back to the first principles of political economy, and especially the finance department of it. In 1810, he produced a notable sensation by his pamphlet entitled *The High Price of Bullion a Proof of the Depreciation of Bank-notes*. The title was a condensation of the principle worked out in the treatise, which gave one of the earliest distinct announcements of the principle of a metallic basis, and the propensity that a paper currency always has to redundance, if it be not in some form or other restrained by the operation of such a basis. This was followed by several pamphlets, each in its turn a success in securing fame and influence. In 1817, appeared his principal work *On the Principles of Political Economy and Taxation*. He had previously in one of his pamphlets touched on the most important feature of this work—the elucidation of the true theory of rent, as not being incidental and casual, like the profits of stock, but a fund that must, under certain conditions of population, come into existence, whoever may draw it (see Rent). Some critics of R. found that the elements of the theory were given in *The Bee* by Dr Anderson (see Anderson, James). R., however, who probably had not read *The Bee*, reached his conclusions in a different and original form, and from his happy method of elucidation, at once secured a general adhesion to the soundness of the theory, which was strengthened by comparing it with Anderson's remarks. R.'s work is one of the clearest and least tedious of all books on political economy. Like almost all works, however, written before free trade actually shewed its power, it narrows the influence of the elements from which the riches of the world can be increased. Like Malthus, he was unable to anticipate the effect of an industrious people having the whole world for their market, and spoke of population outrunning subsistence, and the wages of labour being measured by the price of commodities. In 1818, he entered parliament, and kept his seat till his death. As he had a very clear method of announcing a principle, and being known as a successful man of business, his speeches had perhaps more influence in all matters of trade and money than those of any other member in the present century. He was a zealous student of geology, chemistry, and other sciences. He died on the 11th of September 1823.

RICASOLI, Bettino, Baron, born at Florence 9th March 1809, is descended from a very ancient Lombard family, which established itself in Tuscany in the 13th century. R. studied at Pisa and Florence, and from an early period of his life was imbued with a desire to ameliorate the civil and religious condition of his country. His friends and associates were men like Poerio, Pepe, Coletta, Giordani, Nicolini, &c. But he was averse to revolution, and finding no legitimate opening for himself in political life, quietly subsided into a country gentleman, and set about 'improving' his estates. He is one of the best agriculturists in Italy, and has written on the cultivation of the vine, of the olive, and of the mulberry. His wines of Chianti have gained for him the cross of the Legion of Honour. In 1847, he appeared as a politician; but he hoped to obtain liberty and good laws from princes, and not from the people, and when Leopold II. fled to Gaeta, he retired from public life. Very soon, however, he joined with other Tuscan gentlemen, and after the defeat of Novara, he overthrew the government of Guerrazzi, and recalled the Grand Duke, trusting to the constitutional promises given by the latter. Leopold returned, accompanied by the Austrians; and R., indignant at this treachery, sent back his decoration to the prince, and shut himself up in his castle of Brolio—addicting himself more than ever to agricultural pursuits. For ten years he worked successfully at the drainage of the Tuscan Maremme (q. v.). In 1859, when Tuscany wished to take part in the war of Italian independence, R. reappeared. The Grand Duke fled, and R. was made dictator of Tuscany. After Villafranca, he remained alone in the government, beset by the French emissaries, who were advising him to recall Leopold II. R. fiercely refused to do so; he wished the annexation to Piedmont; and to those who spoke of the dangers he was incurring, he answered in those words, which history will never forget: '*Dopo Villafranca ho sputato sulla mia vita*'—literally, 'After Villafranca I have spit upon my life.' His obstinacy saved Italy, and produced the unity of the Peninsula. On the death of Cavour (1861), R. was called to the ministry, and by another abrupt and decided act, he promulgated political and administrative unity. His cabinet, undermined by Rattazzi, did not stand, and he therefore resigned (March 1862). Italy has faith in him, and in exceptional times he will always be a firm and sagacious dictator. See M. Luigi Passerini's *Genealogia e Storia della Famiglia Ricasoli* (Florence, 1861).

RICCI, Matteo, a celebrated Italian, founder of the Jesuit missions to China, was born at Macerata, in the Marches of Ancona, October 6, 1552; and after studying law at Rome, entered the Society of Jesus in 1571. Six years later, he accompanied to India Père Valignan, 'Inspector-general of the Eastern Missions.' On account of his fine combination of zeal and tact, he was chosen by his superior to introduce a knowledge of the Christian religion into China, and after preparing himself for the arduous undertaking by a study of the Chinese language at the Portuguese settlement of Macao, he endeavoured to effect an entrance into the empire. But his first

efforts were vain, and it was not till 1583 that the Jesuit Fathers obtained permission to settle at Tchao-king-fu. R. quickly saw that it was hopeless to attempt the conversion of the Chinese except by accommodating himself to their intellectual tastes and beliefs, as far as the principles of his religion permitted. Aware of the value which the ruling class—the mandarins—attached to literary skill, he executed and published a Chinese *Map of the World*, and also a little *Catechism*, in which he set forth only such portions of Christianity as embody the general principles of morality. These two productions won R. a high reputation among the Chinese *literati;* the most illustrious mandarins came to visit him, and expressed their esteem for his character and talents. In 1595, he boldly resolved to go to Peking, believing that he could accomplish far more as a religious propagandist in the metropolis than elsewhere. Having obtained permission from his superiors to assume the dress of a Chinese scholar, he set out in the train of a mandarin, who did not allow him, however, to proceed further than Nanking. Expelled thence, he was obliged to return homeward; but at Nan-tchang-fu, the indomitable and adroit priest composed two treatises, entitled the *Art of Memory*, and a *Dialogue on Friendship*, in imitation of Cicero, which so pleased the taste of the Chinese, that they ranked them along with their most esteemed books, and the fortunate author was allowed to proceed north. He reached Peking, and although he could not obtain an interview with the sovereign, he was permitted to fix his residence at Nanking, the second city in the empire, where his fame as a scholar increased from day to day. In 1600, he and his companions were allowed to settle at Peking, and even to build a church. He spent the remainder of his life in teaching mathematics and other sciences, in writing works of a secular as well as a religious kind, and in using his great influence with the king, the court, and the learned classes generally to obtain a favourable attention to the claims of that religion which he represented. R. made several striking conversions, and through his zeal, missionary establishments were set up in the principal cities of China. He died May 11, 1610, and was universally mourned. In the annals of the Chinese empire, he is designated sometimes *Li-ma-teou*, and sometimes *Si-thai*. The most important (for us) of his numerous writings are his Memoirs, published by Père Trigault under the title of *De Christiana Expeditione apud Sinas suscepta ab Societate Jesu, ex M. Riccii Commentariis Libri V.* (Augsb. 1615; Lyon, 1616), which contains a vast number of valuable observations on the geography and history of China. The family of R. possess 66 interesting letters of the great missionary.

RICCIO or RIZZIO, DAVID, an Italian of considerable ability and accomplishments, who, in the reign of Mary Stewart, Queen of Scots, came to Edinburgh in the train of the ambassador from Savoy. His first employment at court was as a musician; but his skill and fidelity led Mary to advance him to the post of her French secretary, about the time of her marriage with Darnley; and in this situation he was believed to possess considerable influence over the queen. His advancement was distasteful to the nobles in general, but more especially to the party of the Reformers, who suspected him of intriguing with the papal court. He became obnoxious on other grounds to Darnley and his father, the Earl of Lennox. The former, who had for a time been on the most friendly footing with him, was easily led to believe not merely that he was the real obstacle to his favourite design of having the crown settled on him and his heirs, but also that he had supplanted him in the affections of the queen. In this belief, he entered into a compact with the leaders of the Protestant party—including Murray, Ruthven, Morton—to assassinate R., and slay even in the queen's palace and presence whoever opposed them. Darnley formally bound himself to prevent the attainder of the conspirators, and procure their pardon, and to support and advance the Protestant faith, while the conspirators in return obliged themselves to procure the wished-for settlement of the crown in his favour. Accordingly, on the 9th March 1566, when Mary, then seven months with child, was sitting at supper in a small cabinet adjoining her bedroom, at Holyrood, attended by the Countess of Argyle, the Commendator of Holyrood, Beaton Master of the Household, Arthur Erskine, Captain of the Guard, and R., the king led the conspirators up a secret stair, while the Earl of Morton, with a troop of soldiers, seized the gates of the palace. Led by the king, the conspirators burst into the cabinet, overturned the table, and threw themselves on R., who sprang for protection behind the queen. Ruthven drew his dagger; Ker of Fawdonside, it is said, held a pistol to the queen's breast; while George Douglas, natural son to the Earl of Angus, snatching the king's dagger, stabbed R. over the queen's shoulder, and dragging him from the cabinet, despatched him in a pool of blood, in the adjoining apartment, with fifty-six wounds. This murder was the first of the series of tragic events in which Mary Queen of Scots was involved. John Knox, in his *History of the Reformation*, characterises it as 'a just act, and most worthy of all praise.'

RICE (*Oryza*), a genus of grasses, having panicles of one-flowered spikelets, with two very small pointed glumes; the florets compressed, the paleæ strongly nerved, awned or awnless, six stamens, one germen, and two feathery stigmas. The only important species is the COMMON R. (*O. sativa*),



Rice (*Oryza sativa*).

one of the most useful and extensively cultivated of all grains, supplying the principal food of nearly one-third of the human race. It seems to be originally a native of the East Indies, but is now cultivated in all quarters of the globe, and almost wherever the conditions of warmth and moisture

are suitable. It is adapted to tropical and subtropical climates, rather to the latter than the former; and requires much moisture, rather, however, in the soil than in the air. R. is an annual, varying from one foot to six feet in height. There are many other distinguishing characters of the varieties in cultivation; some having long awns, and some being awnless; some having the chaff (*paleæ*), when ripe, yellow, white, red, black, &c. The seed or grain of R. grows on little separate stalks springing from the main stalk; and the whole appearance of the plant, when the grain is ripe, may be said to be intermediate between that of barley and of oats. R. requires a moist soil, sometimes flooded; and the cultivation of it has in many places been attended with an increase of intermittent fevers, and of general unhealthiness, the rice-fields being artificially flooded at certain seasons. The cultivation of R. is most extensively carried on in India, China, Cochin-China, and other south-eastern parts of Asia, Japan, Egypt, South Carolina, Georgia, and other southern states of North America. The quantity annually raised in India, whence we chiefly obtain our supplies, is estimated at three and a half million quarters, the value of which is about £2,670,000. In some parts of the East, canals are carried along the sides of hills, in order to the irrigation of land for the cultivation of rice. In Carolina, R. is sown in rows, in the bottom of trenches, which are about 18 inches apart; the trenches are filled with water to the depth of several inches, till the seeds germinate; the water is then drawn off, and afterwards the fields are again flooded for rather more than a fortnight, to kill weeds. They are flooded again, when the grain is near ripening. —In Europe, the cultivation of R. is confined to the most southern regions. It is most extensively carried on in the plains of Lombardy, and in Valencia in Spain. Attempts have been made to cultivate it in more northern parts of Europe, but without success. Marshy situations, where there is always the same abundance of water, are not so suitable to R. as those in which the supply of water is regulated according to the season and the growth of the plant.

Like most cultivated plants, it is very liable to variation, and in India and Ceylon at least, 120 known varieties are cultivated. The best of all R. known in the market is that of Carolina, yet the introduction of R. into that country took place only about the last years of the 17th or the first of the 18th century. Its cultivation there, however, rapidly extended.

R. is known in India as *Paddy*. Another use of this name is to designate R. in the husk.

In China, R. is generally sown pretty thickly on very wet land, and afterwards transplanted to the land which it is finally to occupy. The plants *tiller* or spread at the root very much, so that each sends up several or many stalks. The rice-grounds are carefully kept clear of weeds, although often so wet that a man cannot walk in them without sinking to the knees. In many parts of China, and in other warm countries, it is common to obtain two crops of R. in a year.

R. is shelled and quickly dried before being brought to market. Good Indian R. has the following composition:

	Per cent.
Moisture,	13·00
Nitrogenous Matter,	7·44
Starch,	77·63
Fatty or oily matter,	0·70
Ash,	1·23
	100·00

R. contains, therefore, according to the prevalent views of modern chemists, a smaller amount of *flesh-forming* substances, and a larger amount of *fat-forming* or *heat-giving* substances than any other grain. As a food, it is peculiarly well adapted for hot climates, as it appears to be almost a cure for dysentery and other bowel complaints, independently of which it is a sufficiently nutritious food without being heating. Owing to the small quantity of gluten which it contains, it is capable by itself only of an imperfect fermentation, and is unfit for being baked into bread. It is, however, subjected to fermentation in many countries. The beer made from R. by the Japanese is called *Saki*, and is in general use among them; but before being drunk, it is heated in kettles. Several kinds of *Rice wine* are made by the Chinese, some of them highly esteemed, and very intoxicating. A spirit is distilled from the lees, called *Shou-choo* or *Sam-choo*. The common Arrack (q. v.) of the East is made from rice, and rice is also employed to a very great extent by distillers in Britain.

Rice Starch is made in considerable quantity in Britain. It is sold under the name of *Patent Starch*, and is used in laundries and muslin manufactories.

The straw of R. is used to make straw-plait for bonnets.

The refuse of R., which remains when it is cleaned for the market, and consists of the husk, broken grains, and dust, is valuable as food for cattle. It is known as *Rice-meal* and *Rice-dust*.

CANADA R. (*Zizania aquatica*), the WILD R. of North America, is a species of grass quite different from the true R., and of a different genus. It is common in North America, and particularly abundant in the north-western parts of it; growing in miry places or shallow water, often in the margins of lakes. It has a culm 7—8 feet high, with broad diffuse leaves, and a large terminal panicle of male flowers, with a spike of female flowers at the summit. The flowers have six stamens. The seeds are about half an inch long, slender, farinaceous, affording very good meal, and much used by the Indians where the plant abounds. Attempts to introduce this plant into Britain have hitherto proved unsuccessful; but there are many northern regions apparently more suitable to it, and it has not received all the attention it deserves.

RICE-PAPER. See PAPER.

RICHARD I., king of England, surnamed CŒUR DE LION, was the third son of Henry II. by his queen Eleanor. He was born at Oxford in September 1157. In the treaty of Montmirail, entered into 6th January 1169, between Henry and Louis VII. of France, it was stipulated that the duchy of Aquitaine should be made over to R., and that he should do homage for it to the king of France; also, that he should marry Adelais, youngest daughter of Louis. In 1173, R. joined his mother and his brothers Henry and Geoffrey in their rebellion against the king. The rebels submitted in September 1174, when two castles in Poitou were allotted to Richard. In 1183, a second family feud broke out in consequence of R. refusing to do homage to his elder brother Henry for the duchy of Aquitaine. In this war, his father sided with R. against Henry and Geoffrey. It was ended by the death of Prince Henry, when R., actuated probably by jealousy of his youngest brother John, declared himself the liegeman of France for his possessions in that country. This step led to a war between the king of England and Philip of France, in which R. fought against his father. The balance of success being decidedly with France, a treaty in accordance with this fact was about to be executed, when, by the death of Henry II., on 6th July 1189, R. became

king of England. He landed in his own country on 15th August 1189, and was crowned in Westminster Abbey on the 3d September following. In the hope of gaining salvation, and with the certainty of following the occupation which he loved best, he now set out with an army to join the third crusade, then about to leave Europe. He united his forces to those of France on the plains of Vezelai, and the two armies (numbering in all 100,000 men), marched together as far as Lyon, where they separated and proceeded by different routes to Messina, where they again met. Here R. betrothed his nephew Arthur to the infant daughter of Tancred, king of Sicily, with whom he formed a close alliance. The Sicilian throne was at that time claimed by the Emperor Henry VI.; and the alliance with Tancred, from this cause, afterwards turned out a very unlucky one for Richard. Having settled a difference which now arose between him and Philip respecting his old engagement to Philip's sister Adelais, the English king, on 7th April 1191, sailed from Messina for Cyprus, carrying along with him Berengaria, daughter of Sancho VI., king of Navarre. He had fallen in love with this princess, and he married her in the island of Cyprus, where he halted on his way to Palestine. But even love did not make him forget his favourite pastime of war: he attacked and dethroned Isaac of Cyprus, alleging that he had ill-used the crews of some English ships which had been thrown on his coasts. Having then presented the island to Guy of Lusignan, he set sail on 4th June 1191, and on the 10th of the same month he reached the camp of the crusaders, then assembled before the fortress of Acre. The prodigies of personal valour which he performed in the Holy Land have made the name of Richard the Lion-hearted more famous in romance than it is in history. The man was the creation and impersonation of his age, and the reader who follows his career may perhaps be more interested than he would be by the lives of greater men, or by the history of a more important period. On 9th October 1192, he set out on his return to England. After some wanderings and adventures, he became the captive of the Emperor Henry VI., who shut him up in a castle in the Tyrol. John, meanwhile, ruled in England, and he and Philip of France had good reasons for wishing that R. should never return to his kingdom. He disappointed them; not, however, until he had paid a heavy ransom, and even, it is said, agreed to hold his kingdom as a fief of the empire. On 13th March 1194, he found himself once more in England. His brother John, who had acted so treacherously towards him, he magnanimously forgave, but with Philip of France he could not deny himself the pleasure of a war. In the contest which followed he was generally victorious, but in the end it proved fatal to himself. He was killed by an arrow shot from the castle of Chaluz, which he was besieging, on 26th March 1199. If R. had the vices of an unscrupulous man, he had at least the virtues of a brave soldier.—See *Chronicles and Memorials of Richard I.*, by W. Stubbs, from MS. in Lib. of Corpus Christi Col., 1864.

RICHARD PLANTAGENET, second son of John, king of England was born on 5th January 1208. In 1226, he was created Earl of Cornwall by his brother Henry III. In 1232, he put himself at the head of the party opposed to Hubert de Burgh, whose influence was at that time supreme in the councils of the king. Immense wealth, a calm, practical temperament, and a shrewd eye for his own worldly interest, were the elements which combined to make R. P. a considerable power in the state. His influence prevailed, and De Burgh was driven from his position with loss both of honours and estate. In 1256, R. P. was elected titular king of the Romans; and though his election was disputed, he was crowned at Aix-la-Chapelle. Subsequently, he exercised some of the nominal rights which belonged to his sovereignty. In the great struggle which took place between Henry III. and his nobles, R. P. at first acted the part of a mediator; subsequently, however, he took a decided part with his brother against the party which was headed by Simon de Montfort; and on 14th May 1264, he was taken prisoner by that leader at the battle of Lewes. De Montfort shut him up in Kenilworth Castle, from which he was released at the end of a year. The rest of his life does not seem to have been marked by any event of historical importance. He was thrice married: in 1230, to Isabel, daughter of the Earl of Pembroke; in 1243, to Sanchia of Provence, sister of Queen Eleanor; and in 1267, to Beatrice, daughter of Theodoric de Falkmonte. He died on the 2d of April 1272. His character seems to have been unmarked either by great virtues or great vices.

RICHARD II., king of England, the second son of Edward the Black Prince and Joanna of Kent, was born at Bordeaux on 3d April 1366. He succeeded to the throne on the death of his grandfather, Edward III., 28th June 1377. He being a minor, the government was vested in a council of twelve, from which were excluded the king's three uncles, John of Gaunt, Duke of Lancaster; the Earl of Cambridge, afterwards Duke of York; and the Earl of Buckingham, afterwards Duke of Gloucester. This arrangement is, however, supposed to have been collusive and intended to lull the popular suspicion of Lancaster, under whose control the council really was. The reign of R. is interesting to the student of English constitutional history. We find the recently-established House of Commons eagerly pressing forward to procure a share of political power, by means of the efficient engine of which it had then acquired the sole control—the right of taxation. Again, we find the labouring classes now beginning to aspire to be freed from the state of bondage in which they had hitherto been kept. The famous capitation tax, imposed in 1380, gave rise in the following year to the rebellion of Wat Tyler (q. v.). In June 1382, R. was married to Anne of Bohemia, daughter of the Emperor Charles IV. The next two years were occupied with a war with France, transferred in 1385 to Scotland, where for a while the king conducted it in person. In the absence of John of Gaunt in Spain, the Duke of Gloucester had put himself at the head of affairs; and an attempt which R. made at this time to free himself from control having been defeated, several of his counsellors were put to death, which step, on the part of the victorious party, was approved of by parliament, by whom further executions were ordered among the king's adherents; and the sentences were carried into effect. In 1389, however, R., by a sudden movement, succeeded in throwing off the yoke. Gloucester was obliged to retire; but from indolence and want of capacity, the king soon allowed the reins of government to slip from his own hands into those of the Duke of York, and Lancaster's son, Henry of Bolingbroke. In 1394, the queen died, and soon after a marriage treaty was concluded between R. and Isabella, infant daughter of Charles VI. of France. Gloucester reprobating this marriage, which seems to have been unpopular, R. caused him to be privately arrested and conveyed to Calais, where he died, or was murdered, as has been conjectured. On the meeting of parliament, the king had his own way; the Earl of Warwick was banished, and the Earl of Arundel beheaded. Having triumphed over

his foes, R. now began to quarrel with his friends. A misunderstanding having taken place between Bolingbroke and Mowbray, Duke of Norfolk, the king, desirous to be rid of both, sent the former into banishment for ten years, and the latter for life. But Bolingbroke had been assiduously cultivating the popularity which his cousin had been as assiduously throwing away; and the result became apparent in 1399. On his return, in that year, from a military expedition in Ireland, R. found that Bolingbroke had, in his absence, landed in England; that he had soon found himself at the head of a formidable army, and that the Duke of York had yielded and gone over to his side. The army which the king had had with him in Ireland, also, no sooner landed than it almost entirely passed over to the invader. R. found himself without force or friend, while Bolingbroke, now styling himself Duke of Lancaster, was at the head of 80,000 men. Meeting the conqueror at Flint Castle, R. was carried captive in his train to London. On 29th September 1399, he formally resigned his crown. On the following day, the resignation was ratified by parliament, and the crown conferred on Lancaster. By order of the peers, R. was confined secretly in a castle, but where is not known. In the February following his resignation, the nation was told that he was dead, and his body, or what was supposed to be it, was brought with much pomp from Pontefract Castle, and shewn to the people. There were rumours at the time of his having been murdered, and long afterwards of his being alive and in Scotland. But nothing really authentic is known regarding the end of Richard II.

RICHARD III., king of England, was the youngest son of Richard Duke of York, and the great-grandson of Edmund Duke of York, the fifth son of Edward III. R. was born at Fotheringay Castle on 2d October 1452. On the defeat and death of their father in 1460, he and his brother George, afterwards Duke of Clarence, were sent by their mother to Utrecht, where they remained for a short while under the protection of the Duke of Burgundy, until the crown was won by their eldest brother, Edward IV. In 1470, R. along with Edward remained in Flanders, whither they had fled on the success achieved for Margaret of Anjou by the Earl of Warwick. In 1471, he led the van of his brother's army at Barnet; he also rendered efficient assistance at the crowning victory of Tewkesbury. It is said that he and Clarence murdered Prince Edward, son of Henry VI., after the battle. It has also been popularly believed that he murdered Henry himself in the Tower. Now Duke of Gloucester, in 1472 he married Lady Anne Neville, daughter of Warwick, and widow of Prince Edward. He has been generally accused of complicity in the judicial murder of his brother Clarence in 1478, and Shakspeare has placed the charge almost beyond the power of historical criticism to efface. The evidence, however, seems to be almost null. In 1483, on returning from an expedition into Scotland, he heard of the death of his brother the king. He met the Duke of Buckingham at Northampton, where it is believed that those measures were concerted which resulted in the execution of Hastings and others, the confinement in the Tower of the infant children of the late king, and the placing of the English crown on the head of Richard III. His reign dates from 26th June 1483. He was crowned at Westminster on the following 6th of July. For some time he seems to have been really popular. He was well received on a tour which he made in the northern counties. On reaching York, however, on his return, he heard of a formidable insurrection which had broken out in the south in favour of his nephew, Edward V. But the bold and remorseless nature of R. was on this occasion triumphant. It was soon known over the land that the royal children were dead. Little doubt has ever been held that they were murdered, or that the deed was done at the instigation of their uncle. The insurrection was quelled, and Buckingham, who had been at the head of it, found guilty of treason and executed. The parliament, which met on 23d January 1484, declared the issue of the late king to be bastard, and the property of the late rebels confiscated. R. now offered to marry the Princess Elizabeth, daughter of Edward IV., to his eldest son, Edward, on whose premature death he offered to marry the princess himself, his own queen being still alive. On the death of Anne, however, supposed to have been murdered by poison, on 16th March 1485, R.'s counsellors dissuaded him from marrying Elizabeth, on the ground of the popular indignation which the step was sure to excite. Meanwhile the crimes which his ambition had already led him to commit, had excited the deepest disgust both among nobility and people. One by one his adherents were dropping off, and crossing to France to join the Earl of Richmond. At last the storm burst. On the 7th August 1485, Richmond landed at Milford Haven. On the 21st of the same month was fought the decisive battle of Bosworth. It deprived Richard both of his crown and life, and decided the long war of the Red Rose and the White in favour of the House of Lancaster. R. was doubtless a man of great energy and ability, but in his aims, selfish and unprincipled. It must, however, be kept in view that his age was one in which human life was held of little value, and deception regarded almost as an accomplishment. See Life by J. H. Jesse (London, 1862.)

RICHARD OF CIRENCESTER—in Latin, *Ricardus Corinensis*—a well-known early English chronicler, was born at Cirencester in Gloucestershire, in the first half of the 14th c., but nothing whatever is known of his family or circumstances. In 1350, he entered the Benedictine monastery of St Peter, Westminster—whence he is sometimes called the 'Monk of Westminster'—and remained there for the rest of his life. His leisure was devoted to the study of British and Anglo-Saxon history and antiquities. In the prosecution of his investigations, R. is said to have visited numerous libraries and ecclesiastical establishments in England, and we know for certain that in 1391 he obtained a licence from his abbot to visit Rome. He died in 1401 or 1402. R.'s principal works are *Historia ab Hengista ad Ann.* 1348, in two parts, of which the first (preserved in the public library of Cambridge) treats of the affairs of England from the Saxon invasion to the death of Harold; two theological productions (in the Peterborough library), a *Liber de Officiis Ecclesiasticis*, and a *Tractatus super Symbolum Majus et Minus;* and above all his *De Situ Britanniæ*, a treatise on the ancient state of Great Britain. This work—of which, however, it must be admitted that the authenticity is doubtful—was, curious to say, first brought to light by Dr Charles Julius Bertram, professor of English at Copenhagen, in 1747, who professed to have discovered it in the Royal Library there, and who sent a transcript of it, together with a 'fac-simile' of the original, to the celebrated English antiquary, Dr Stukeley. This gentleman published an analysis of it in 1757, and in the same year Professor Bertram published the whole treatise, along with the 'remains' of Gildas and Nennius, under the title *Britannicarum Gentium Historiæ Antiquæ, Scriptores tres, Ricardus Corinensis, Gildas Badonicus, Nennius Banchorensis.* A

new edition with an English translation and a 'fac-simile,' and a biography of the supposed author, appeared at London in 1849, and a reprint forms one of the 'Six Old English Chronicles' in Bohn's 'Antiquarian Library' (1848). If we could feel quite sure that the work was genuine, it would be of the highest importance for the study of British and Roman-British antiquities, but unfortunately Bertram's 'original' (like the 'original' of Macpherson's *Ossian*, and Joe Smith's *Book of Mormon*) is not to be found, nor does it appear that anybody ever saw it but himself, so that Gibbon's praise, 'that he [Richard] shews a genuine knowledge of antiquity very extraordinary for a monk of the 14th century,' must be regarded with suspicion.

RICHARDSON, SAMUEL, the first great English novelist, was born in Derby, in the year 1689. His father, though originally connected with a higher grade of society, was a joiner. It was his ambition to educate his son for the church; but for this the means were found deficient, and at the age of 17, with simply such an education as a country school could then furnish, the young man fared forth to London, where he became apprentice to one John Wilde, a printer. In the discharge of his business duties he was exact and careful, and on the expiration of his apprenticeship he became foreman of Mr Wilde's establishment. Some years afterwards, he started as printer on his own account in Salisbury Court, Fleet Street; and on finding his success assured, he wedded Miss Allington Wilde, the daughter of his late employer. After her death in 1731, he was again married to a Miss Leake. By each lady he was blessed with six children, of whom only four daughters along with their mother survived him. Throughout life, in his business relations, he was prosperous; very early he had influence to secure the lucrative post of Printer of the Journals of the House of Commons; in 1754, he became Master of the Stationers' Company; and in 1760, he purchased the moiety of the patent of King's Printer; but died on 4th July of the year following.

Richardson's genius flowered late. Till he had turned 50, his relations with literature, except in the way of printing it, were of the most slight and amateur kind; but in 1740 he surprised the world with his *Pamela*, which had instant and great success. Its continuation, to which the author was stung by the attempt of some hungry scribe to make a meal or two by the issue of a pretended sequel, entitled *Pamela in High Life*, was, however, pronounced much inferior. Memorable in itself, the work is now to most readers more so, as having suggested to Fielding his *Joseph Andrews*, originally conceived as a parody of Richardson's somewhat prudish moralities. The exquisiteness of the satire was not appreciated by Richardson; and he never forgave Fielding for it, or could speak of him after with common temper or patience.

In 1748, he issued the first four volumes of *The History of Clarissa Harlowe*—by common consent his masterpiece—a work which in its progress to completion excited the most intense interest. His third and last great work, *The History of Sir Charles Grandison*, was published in 1753. As a whole, this is less interesting than its predecessors; and in his representation of the life of the fashionable classes, of which he had no clear personal knowledge, the writer succeeds but indifferently.

R.'s method of minute elaboration has in itself some tendency towards an effect of tedium; moreover, the epistolary vehicle which he has chosen, though with certain advantages of its own, does not subserve rapidity of movement; and as his stories run to immense length, their perusal involves some effort of patience. But in the depth and simplicity of his sentiment, his profound knowledge of the heart, and mastery of elemental emotion, there are singular sources of attraction; and in virtue of the overwhelming effects of pathos in which the interest of his *Clarissa* culminates, a place must always be assigned him among the very few potent masters of genuine tragic passion. His specialty lies in subtle analysis of the intricacies of female mind and emotion; and in this particular field he has scarcely perhaps been surpassed. A curious sort of passionless confidential intimacy with women, it seems from his earliest years to have been his instinct to cultivate; throughout life he was the centre of a circle of female friends and admirers, who came to him with their little delicate secrets, as to a kind of lay father-confessor; and of the fruits of his nice observation of them he has given us to the full in his novels. The success of these is said to have bred in him a somewhat inordinate vanity, the only little flaw in a character unusually blameless and amiable. Of works of less importance he published, besides occasional contributions to periodicals, *The Negotiations of Sir Thomas Roe in his Embassy to the Ottoman Porte from 1621 to 1628* (1740, fol.); *An Edition of Æsop's Fables, with Reflections; Familiar Letters to and from several Persons on Business and other Subjects;* and in 1804 there appeared his *Correspondence Selected and Published, with a Biography by Anna Letitia Barbauld.*

RICHARDSON, SIR JOHN, K.C.B., M.D., LL.D., &c., a celebrated traveller and naturalist, was born November 5, 1787, at Dumfries, of which town his father, Gabriel Richardson, Esq., was several years provost. In his 14th year, he left the Academy of Dumfries to study at the University of Edinburgh, with a view to the medical profession. After obtaining his diploma, R. entered the royal navy, and in 1807 was appointed assistant-surgeon to the *Nymphe* frigate, in which he was present at the battle of Copenhagen. Sometime later, the *Nymphe* was engaged in the blockade of the Tagus, when, after twice volunteering to go in the boats on cutting-out expeditions, R. was transferred to the flag-ship. After the convention of Cintra the ships left the Tagus, and R. was nominated to the *Blossom* sloop of war, in which he served on the coast of Africa, Lord Exmouth removing him to the *Bombay*, 74, in 1810. His next services were in the *Cruiser*, on the Baltic and North Sea stations; afterwards surgeon of the 1st battalion of Royal Marines, stationed in Canada, and later doing service in Georgia, R. having charge of the hospital ship for the sick and wounded of the brigade. His next appointment, 1819, was that of surgeon and naturalist to the overland expedition under Franklin. In 1822, R. returned to England, and early in 1824 became surgeon to the Royal Marines at Chatham. In 1825—1827, he accompanied Franklin in his overland expedition to the mouth of the Mackenzie, and by orders of the Admiralty was detached to survey the coast between that river and the Coppermine, executing the task with singular success and ability. On returning from this expedition, R. resumed his duties at Chatham, remaining there till his promotion, 1838, to be physician of Haslar Hospital, and inspector of naval hospitals and fleets. In 1846, R. received the honour of knighthood; and two years later, moved by genuine friendship and unsurpassed self-devotion, set out to search for and if possible save his former travelling companion, Sir John Franklin, of whom nothing had been heard for upwards of two years. On March 25, 1848, R., accompanied by Mr Rae, departed from Liverpool

to look for the missing expedition between the Mackenzie and Coppermine Rivers. Landing at New York, R. hastened by way of Montreal and the Canadian lakes to the head-waters of the Mackenzie, which he descended, and then turned eastward by Capes Bathurst and Parry. Contrary to former experience, the sea towards Cape Krusenstern was found closely packed with dangerous drift-ice. After immense labour the party reached Cape Hearne, where it was found necessary to abandon the boats, and after 12 days' fatiguing march, through half-frozen swamps and over hills covered with snow, succeeded in gaining Fort Confidence, at the north point of Great Bear Lake. Here R. spent the winter in scientific observations, returning to England in 1849, and resuming his duties at Haslar. In 1855, R. tendered his resignation, after 48 years of almost unexampled activity in the public service. Moved in all his actions by a high sense of honour and sincere piety, possessed of the most unselfish nature, and a mind so acute as almost intuitively to form correct judgments, united with the humble and loving disposition of a child, R., during his long career, was one of the most loveable as well as useful men of the present century. Up till his death, 5th June 1865, he possessed much of the elasticity of youth; and whenever a scientific society assembled, he was found leaving for a time his quiet home by the Lake of Grasmere to take part in the deliberations.

R. was a fellow of the Royal Societies of London and Edinburgh, of the Royal Geographical Society, member of the Geographical Society of Paris, and of many other literary and scientific bodies in Great Britain, the continent of Europe, and America. He contributed largely to the account of Franklin's first expedition (Lond. 1823); and to that of the second expedition (Lond. 1828). In 1836, appeared *Fauna Boreali-Americana. The Fish; A Boat Voyage through Rupert's Land and the Arctic Sea* (Lond. 1851), *The Polar Regions* (1861). Besides zoological appendices to the voyages of Parry, Ross, Back, &c., his contributions to the Journals and Transactions of various societies have been very numerous. A recent work is the *Museum of Natural History*, in conjunction with several other distinguished naturalists.

RICHELIEU, Armand Jean du Plessis, Cardinal, Duc de, was born of a noble but impoverished family at Paris, September 5, 1585, and was educated for the military profession at the College de Navarre. On the retirement to a religious life, however, of his elder brother, who held the bishopric of Luçon, R., with a view to succeeding to this preferment, betook himself to ecclesiastical studies, and underwent the preliminary examination for his degree at the Sorbonne. In 1607, he was consecrated Bishop of Luçon at Rome by Cardinal de Givry, in presence of Pope Paul V., and for some time devoted himself zealously to the discharge of his duties in his diocese. At the States-General in 1614, being appointed one of the representatives of the clergy, he attracted the notice of the queen-mother by an address which he delivered in the presence of the young king, Louis XIII.; and by his appointment in 1616 as secretary at war and foreign affairs, the way seemed opened to his success in political life; but in one of the vicissitudes of state intrigue common at that period, he soon found it necessary to withdraw from court, and return to his diocese. Meanwhile, a rupture occurred between the queen-mother and the king, and R., through the agency of a very remarkable man—the celebrated Capuchin Father Joseph—whose fortunes thenceforward were inseparably united with those of R., succeeded in effecting their reconciliation (August 1620), and the restoration of the queen to her position at court. The foundation of R.'s influence in consequence was solidly laid; but he appears to have acted with much tact and patient forbearance. He formed an alliance with the powerful favourite, the Duc de Luynes, and in 1622 was named cardinal, and two years later, 1624, he was made minister of state—a position which, although frequently menaced, and constantly beset by every variety of court intrigue, he retained to the end of his life. His first important measure was the conclusion of the alliance with England, by the marriage of Henrietta, sister of the king, with Charles, then Prince of Wales, in 1624. His successful conduct of the war of the Valteline, an affair of much delicacy for a cardinal, as presenting the pope himself as the antagonist of France, tended still more to strengthen his power. His enemies, however, were constantly on the watch for opportunities of undermining his influence, and even of bringing about his death. The queen withdrew her favour, and the king, while he trusted him implicitly, never ceased to fear him. The crisis of the struggle took place December 11, 1630, when R. himself believed that his fate was inevitable. His disgrace, indeed, had been decided; the king, fearing to meet him face to face, had refused him an audience. His attempts to force an entrance to the king at the Luxembourg were defeated; but Louis, in his weak fear of R., having withdrawn to Versailles, the cardinal there succeeded in obtaining an audience, and having once effectually overborne the weakness and alarmed the fear of the sovereign, his supremacy remained from that day firmly and irrevocably established. This famous day is known as *Le Journée des Dupes*.

The administration of R. forms an epoch in the history of the constitution of the kingdom of France, as well as of her relations with other countries. It is memorable for several great measures, or series of measures, through which the posture of affairs underwent a complete and permanent change. Of these, the first and the most lasting in its results was that by which the absolute authority of the sovereign was established. From the medieval period, the power of the French kings had been controlled, and in many cases overridden by the feudal privileges of the nobles; and in the stormy conflicts of the 16th and of the beginning of the 17th centuries, the power of the crown had often been reduced to a cipher. By a succession of vigorous and energetic, and it must be added not unfrequently unscrupulous measures, R. succeeded in breaking down the political power, and subduing the arrogant assumptions of the great families; the heads of several among which were brought to the scaffold, while not a few were condemned to life-long imprisonment. Among his most inveterate and most powerful adversaries was Gaston, Duke of Orleans, brother of the king; but R. triumphed over him, and even the queen-mother, Maria de Medicis, was obliged to bow before the unbending spirit of R., and to withdraw into exile at Cologne; and R., at the close of his career, delivered up the royal authority, which he had wielded for 18 years, almost without a single constitutional check upon its absolute exercise.

Another of the great enterprises of this minister was the overthrow of the Huguenot party as a political power, and a rival of the throne in France. The siege and capture of Rochelle, which he conducted in person (1628), was followed by the submission of the other Huguenot strongholds. R., however, secured for the Huguenot body a certain measure of religious toleration; and, on the whole,

is confessed to have used his success in this conflict with moderation.

In the external relations of France, the great object of all his measures was the overthrow of the preponderance of Austria. With this view he did not hesitate to foment the internal disaffections of Germany, even allying himself with this design with the German Protestants, and even with the great champion of the Protestant cause, Gustavus of Sweden; and in connection with his anti-Austrian policy, he also took part with the disaffected Spanish provinces in the Netherlands. His designs on Belgium, however, failed of success. With similar views he lent his support to the revolt of Catalonia against Philip IV., and sent an army into Piedmont; nor is there any part of his foreign policy to which he adhered with such pertinacity to the very end of his life.

His internal administration of France has been severely criticised. He was reckless and unscrupulous in the use of means against his enemies, and the expenditure which his foreign wars entailed led to many and oppressive impositions. His own personal expenditure was magnificent even to prodigality, but he is acquitted of all sordid schemes of self-aggrandisement.

R. died at Paris, 4th December 1642. Notwithstanding his many distracting occupations, the writings which he left behind fill several volumes. Some of these, ascetical or controversial, were written before his entrance into political life. Of his later writings, his *Testament Politique* and his *Memoirs* have attracted much notice. He even indulged occasionally in literature, and wrote two plays of indifferent reputation. His letters are numerous, and many of them full of interest. He was a liberal patron of literature, and to him France owes the establishment of the Royal Printing Presses and the foundation of the French Academy.

RICHMOND, a market-town and parliamentary and municipal borough in the North Riding of Yorkshire, on the left bank of the Swale, 42 miles north-west of York. The parish church is chiefly in Gothic, but partly in Norman architecture; the grammar-school has an endowment of £270 a year, and attached to it are six scholarships. Though the trade of R. is now much less extensive than in earlier ages, iron and brass founding and tanning are carried on, and there are a paper and several corn mills. The borough returns two members to the House of Commons. Pop. of municipal borough in 1861, 4290.

The Earldom of Richmond was conferred by the Conqueror upon his kinsman, Alan Rufus, Count of Bretagne; but came into the possession of the crown when Henry, Earl of Richmond, succeeded Richard III. as Henry VII. The title of Duke of Richmond was afterwards conferred by Charles II. upon his son Charles Lennox, in whose family it still remains. The castle, surrounded by picturesque scenery, stands on a rock overlooking the river. In the vicinity are some ruins of a small monastery, founded in 1258.

RICHMOND, a small town of Surrey, 10 miles west-south-west of London by railway, stands partly on the summit and declivity of Richmond Hill, and partly on the level right bank of the Thames. The rich and beautiful scenery of the vicinity is seen with advantage from the terrace, which stretches along the brow of the hill. The parish church contains the tombs of Thomson the poet, and of Kean the tragedian. The banks of the Thames are studded with delightful villas, and around the town are numerous nurseries and kitchen gardens. Pop. (1861) 10,921, who derive their subsistence chiefly by providing for the wants of the immense numbers of visitors and pleasure-seekers who frequent the town, especially during summer.

R., which was formerly called Scheen or Sheen, received its present name from Henry VII., who named it after his own earldom. It was a royal residence in the time of Henry I., and since that time the sovereigns of England have frequently resided here, and here Edward III., Henry VII., and Elizabeth died. Richmond Park, 8 miles in circuit, is open to the public.

RICHMOND, the capital of Virginia, U. S. America, on the left bank of the James River, at the head of tide water, 150 miles from its mouth, lat. 37° 32′ 17″ N., long. 77° 27′ 28″ W., 100 miles south of Washington, picturesquely situated on the Richmond and Shockoe Hills, on the lower falls of the James River, and regularly laid out and built, and surrounded with beautiful scenery. The capitol is a stately building in the centre of a park of 8 acres, the grounds of which are ornamented with trees and statuary. There are also handsome state and county edifices, penitentiary, theatre, orphan asylum, 23 churches, 4 colleges, 4 daily and 9 weekly newspapers, 4 cotton and 50 tobacco factories, extensive flouring-mills, forges, furnaces, and machine shops. The exports, chiefly tobacco and flour, in 1859 were 6,682,258 dollars. Vessels drawing 10 feet can come within a mile of the centre of the city; those of 15 feet to three miles below. A canal round the falls gives a river navigation 200 miles further, and a canal and several railways connect it with the great network of southern railways. R. was founded in 1742. In 1811, the burning of a theatre destroyed the lives of 70 persons, including the governor of the state. In June 1861 it was selected as the Confederate capital, and from that period was the objective point of a series of formidable military expeditions for its capture, under Generals M'Dowell, M'Clellan, Burnside, Hooker, Meade, and Grant, and defended by General Lee with a large army and formidable lines of fortifications, until the seizure of the lines of supply by Generals Grant and Sheridan compelled its evacuation after a series of sanguinary battles, April 3, 1865. A considerable portion of the city was destroyed by the retreating Confederates. Pop. in 1860, 37,910.

RICHMOND, a village of Indiana, U. S., on the east fork of Whitewater River, the Indian Central Railway, and terminus of the Cincinnati, Eaton, and Richmond Railway, 70 miles north-west of Cincinnati. The river gives water-power to factories of cotton, wool, and flour, &c., and it has a brisk trade with a fertile and populous country. There are 11 churches and 3 newspapers. Pop. in 1860, 6603

RICHTER, Jean Paul Friedrich, better known as 'Jean Paul,' a German humorist and sentimentalist of the greatest singularity, hence called by his countrymen *Der Einzige* (The Unique), was born at Wunsiedel, in Bavaria, March 21, 1763. His father, who was a poor schoolmaster at the period of R.'s birth, subsequently became parish priest at Schwarzenbach, on the Saale; but his circumstances always remained straitened, and he died burdened with debt, while his son was attending the gymnasium at Hof. Nevertheless, R. went to the university of Leipzig in 1780 to study theology, which did not prevent him from roving freely over the whole circle of literature. The exact extent of his scholarly acquirements cannot well be ascertained; his studies were never systematic, and it is probable that he was not deeply read in any single branch of learning, but he carried in his head or in his note-books a vast

confused miscellany of facts, literary, scientific, philosophical, and theological, and strewed them with oriental profusion over the pages of his works, where they do duty as metaphors, or illustrations after the most grotesque and wonderful fashion. The English satirists, Pope, Swift, and Young, appear to have been special favourites with him; and among his own countrymen, Hamann and Hippel. But the most marvellous thing about his student-life was not the extent or variety of his reading, but the fact that he had the heart to read at all! During the whole time he was plunged in the most miserable poverty. He could hardly get a single private pupil, and passed many a day without tasting food. Hunger was, in truth, his constant companion. In desperation he betook himself to literature for a subsistence, but it was long before he won recognition. His first composition, *Das Lob der Dummheit* (The Praise of Folly), modelled on the *Moriæ Encomium* of Erasmus, could not find a publisher; his second, written, he tells us, while he was surrounded by 'unpaid debts and unsoled boots,' *Grönländische Processe* (Greenland Lawsuits, 2 vols., Berl. 1783—1785), did succeed in getting itself published but not read, and at length the heroic fortitude of R. gave way. In 1785, he fled from the city to avoid incarceration for debt, and took refuge with his mother at Hof. Here his circumstances were little better; and in 1786, he was glad to accept a tutorship at Topen in the family of Herr von Oerthel. In 1790, at the request of several families of Schwarzenbach, he removed thither to take charge of the education of their children, and lived in this way as a private schoolmaster for some years. Meanwhile, he had not given up authorship. In 1788, appeared at Gera his *Auswahl aus des Teufels Papieren* (Selection from the Devil's Papers), which, however, in spite of its captivating title, did not prove more popular than its predecessors. R. seemed destined to failure as a writer. His sarcastic, far-glancing, and grotesquely-sportful humours were so unlike anything else in literature, and so oddly, not to say extravagantly, expressed, that the mass of readers could make nothing of them at all, and perhaps charitably regarded the author as crazy. But in 1793 the turning-point in his fortunes and fame occurred. In that year, a work which he had published at Berlin, *Die Unsichtbare Loge* (The Invisible Lodge), and which was a sort of romance based on his experience as a schoolmaster, proved unexpectedly successful, and R. began to grow a little more familiar with the sight of gold. It was followed by *Hesperus* (4 vols., Berl. 1794), the work by which he is perhaps best known out of Germany; *Quintus Fixlein* (Baireuth, 1796); *Biographische Belustigungen unter der Gehirnschale einer Riesin* (Biographical Recreations under the Cranium of a Giantess, Berl. 1796); *Blumen-, Frucht-, und Dornenstücke* (Flower, Fruit, and Thorn Pieces, 4 vols., Berl. 1796—1797), the opening chapter of which contains his magnificent 'Dream of the Dead Christ,' translated into English by Carlyle; *Jubelsenior* (The Parson in Jubilee, 1797); and *Das Campanerthal* (Erfurt, 1798), a work on the immortality of the soul, which attracted the notice and won for its author the friendship of Herder. R. was now one of the greatest celebrities of Germany; his books had become quite the rage, especially among educated women. He himself, too, was personally a great favourite; there was something in his conversation and manner so winning, joyous, and charmingly tender, that it excited not only friendship but love. We read of one brilliant woman, Charlotte von Kalb, who actually sought to obtain a divorce in order that she might marry R.; and of another who committed suicide because he would not return her unlawful passion. This last incident affected R. profoundly. He was not only perfectly innocent in all his relations with the other sex, but pure and high-minded to a degree, and he had remonstrated with the unhappy maiden in the most wise and delicate manner. In 1801, after he had become famous, he married Caroline Mayer, daughter of Professor Mayer of Berlin, and with his young wife travelled about Germany a good deal, visited Goethe and Schiller, with neither of whom, however, he became intimate, and formed a closer acquaintance with old Gleim, Wieland, &c.; but ultimately settled at Baireuth, in Bavaria, where he devoted his time with the most honourable assiduity to work. His aërial, fantastic, many-hued creations—his solemn images of glory and gloom—his riant humours—his burlesque speculations on life, manners, and, indeed, on the *omne scibile*—his innumerable descriptions of nature, soft-glittering as with morning dew, flowed from him as from inexhaustible fountains. The productions belonging to his later period of a humorous kind are, *Titan* (4 vols., Berl. 1800—1803), considered by R. himself his greatest work; *Flegel Jahre* (happily rendered by Carlyle 'Wild Oats,' 4 vols., Tüb. 1804—1805); *Katzenberger's Badereise* (2 vols., Heidelb. 1809); *Des Feldpredigers Schmelzle Reise nach Flätz* (Tüb. 1809); and *Der Komet, oder Nikolaus Markgraf* (3 vols., Berl. 1820—1822). Among works of a professedly reflective or philosophical character (though the elements of humour and poetry are by no means absent), we may mention his *Vorschule der Aesthetik* (3 vols., Hamb. 1804), *Levana oder Erziehungslehre* (Brunswick, 1807), a treatise on education; and numerous other pieces. R. died November 14, 1825. In his latest years he was afflicted with a decay of his physical powers, and in his last year with total blindness. The death of his son Max, in 1821—a youth of great promise—inflicted an incurable wound on his heart.—See *Wahrheit aus Jean Paul's Leben* (Bresl. 1826—1833), a work begun by R. himself; Düring's *Leben und Characteristik Richter* (2 vols., Leip. 1830); Spazier's *Jean Paul Friedrich Richter ein Biographischer Commentar zu dessen Werken* (5 vols., Leip. 1833). Some of his pieces have been translated into English by Carlyle and others; Carlyle has also given us two admirable essays on the life, writings, and genius of the man, to which we refer our readers.

RI'CINUS. See CASTOR-OIL PLANT.

RI'CKETS, or RACHI'TIS (from the Gr. *rhachis*, the spine, because a peculiar form of spinal curvature results from the affection), is regarded by some writers as a special disease of the bones, and by others as merely one of the various forms of scrofula. Whichever view be correct, there can be no doubt that the general symptoms in rickets are closely allied to those in scrofula, and that the same general plan of treatment is equally useful in both affections. The characteristic symptom in rickets is the imperfect development, atrophy, softness, and consequent distortion of some or many of the bones. The bones thus affected consist of a sort of gelatinous tissue, which will bend without breaking; and they are so soft that they may be cut with the knife. On microscopico-chemical examination, the structural arrangement of the bone is found to be unaffected, while there is a great deficiency of the earthy salts to which the normal bones owe their firmness. While 100 parts of healthy bone contain about 32 per cent. of organic matter, and 68 per cent. of inorganic matter, or earthy salts, the proportions are altogether reversed in rickets. Thus,

in this disease, Marchand found 79·4 per cent. of organic matter, and 20·6 of earthy salts in a femur; while Ragsky found 81·12 per cent. of organic matter, and only 18·88 of earthy salts in a humerus: thus shewing that these bones contained less than one-third of the normal quantity of earthy salts. The weight of the body acting on bones thus constructed causes them to bend, and the thighs or shins are abnormally arched, or the spine is curved, or, in slighter cases, only the normal form of the ankle is modified. In aggravated cases, the chest is so affected as to give rise to the condition known as *pigeon-breasted;* the lower jaw is imperfectly developed, and the teeth project; and the pelvis becomes so altered in form as to render future childbearing in the highest degree perilous. Rickets is exclusively a disease of childhood, and generally attacks the children of the poor.

The treatment must be mainly directed to the improvement of the general health. Free exposure to pure bracing air, sponging with sea-water, or sea-bathing if the little patient can bear it, an abundance of animal food, cod-liver oil, iron, and quinia, include all that need be said about general treatment. Dr Druitt recommends a jelly containing phosphate of lime (with the view of restoring to the bones the salt in which they are specially deficient). It is well worthy of further trial, and may be prepared as follows: Boil about four ounces of ivory-dust in water for ten minutes; then strain off the water, and throw it away with the impurities which it has taken up. Add more water, in which the dust should be stewed till the jelly is extracted, and the dust itself is soft enough to crush between the teeth. Lemon-juice, wine, sugar, or other flavouring ingredients, may be added; and the softened ivory-dust should be eaten with the jelly.

When a child with crooked legs is brought to a surgeon, he must carefully ascertain whether the crookedness depends on mere relaxation of the joints, or whether it lies in the bones themselves. In the former case, the child will probably grow up straight when his general health improves; whereas in the latter case (if the femur or tibia is absolutely bent), the surgeon must give a very guarded opinion.

RICKMAN, THOMAS, a distinguished architect, was born at Maidenhead in 1776. He was unsettled in early life, and tried several employments both in London and Maidenhead. He managed his father's business of druggist for some time, and afterwards became a clerk in an insurance office. He seems to have always had a love for architecture, and to have studied it carefully. In 1808, he began to give his full attention to it, and wrote the classification of Gothic styles, which has rendered him famous. He first pointed out the features which distinguish the different periods of that style. He divided it into four periods, and called them Norman, Early English, Decorated, and Perpendicular (q. v.), and these names and the dates he assigned to them are still the most frequently used.

R. became after this an architect in Birmingham, and was employed to design a great many buildings, especially churches. He died in March 1841. His work is called *An Attempt to discriminate the Styles of Architecture in England from the Conquest to the Reformation.* It was first written for Smith's *Panorama of Science and Art,* and has passed through several editions; that by Parker of Oxford (1847) is the best.

RI'COCHET, in Artillery, is the bounding of a shot along the ground which takes place when a gun is fired low. Ricochet firing is found extremely useful both in its actual and moral effect in clearing the face of a ravelin, bastion, or other rather long line of fortification. If well directed, the ricochet shot bounding along will dismount guns, scatter the gunners, and greatly intimidate the garrison. Vauban first introduced ricochet firing at the siege of Philipsburg in 1688. The defence against this sort of attack consists in earthen traverses along the threatened line, or in a bonnet (see FORTIFICATION), at the point of parapet nearest the enemy. In the field, ricochet, where the shot or shell is made to bound forward at least ten times, produces most disastrous and demoralising effects on masses of cavalry and infantry, whom it hews down in long lines.

RIDDLE (Ger. *räthsel*), a paraphrastic presentation of an unmentioned subject, the design of which is to excite the reader or hearer to the discovery of the meaning hidden under a studied obscurity of expression. In the present day, the riddle is a mere *jeu d'esprit*—a sort of witty pastime for idle people; we only meet with it under the form of Conundrum (q. v.), but anciently—and its antiquity is very great—it held a far higher place, and was put to far more important uses, although in its inferior phase of conundrum it was likewise a part of the intellectual entertainment at Greek, and latterly at Roman banquets. Among the easterns, it naturally associated itself with their symbolical modes of thought, and was also, as it still is, abundantly employed for didactic purposes. The so-called Proverbs or sayings attributed to Solomon frequently assume the form of riddles. Josephus relates, on the authority of Dius, the Phœnician historian, and of Menander of Ephesus, that Hiram, king of Tyre, and Solomon had once a contest in riddles or dark sayings, in which Solomon first won a large sum of money from Hiram, but ultimately lost it to Abdemon, one of Hiram's subjects—a curious instance of philosophical gambling. Every reader of the Old Testament is familiar with the riddle which Samson proposed to the Philistines, and the 'enigmas' (as the Septuagint has it) that the Queen of Sheba proposed to Solomon, though it is perhaps doubtful if the latter were more than hard or difficult questions plainly put. The riddle is found in the Koran, and several books of riddles exist in Arabic and Persian. It would appear that they were also known to the ancient Egyptians, while among the Greeks they were allied in the earliest times with the *oracula,* or mystic utterances of the inspired priests, and were generally, as is the case with Samson's riddle, in verse; but in Greece they first came into vogue about the time of the 'Seven Wise Men,' one of whom, named Kleobulos, as also his daughter Kleobuline, was celebrated for the composition of metrical riddles (*griphoi*), some of which are still remembered. Even the greater poets did not refuse to introduce the riddle into their writings, or to devote whole poems to the subject—as, for example, the *Syrinx,* commonly ascribed to Theocritus. Homer, according to a statement in Plutarch, died of chagrin at not being able to solve a riddle; and the riddle of the Sphinx (see ŒDIPUS) is probably the most celebrated in the whole circle of philosophical puzzles. Among the Romans, professional riddle-makers did not make their appearance till the latest period of Roman literature, the reason assigned for which is the superior gravity and earnestness of the Roman genius, which, it is said, did not easily find pleasure in such modes of intellectual activity. Appuleius wrote a *Liber Ludicrorum et Griphorum,* but it is no longer extant, and almost the only name we can fix upon is a certain Cælius Firmianus Symposius, whose riddles, comprising a hundred hexametrical triplets,

are termed by Aldhelmus (8th c.), apparently with justice, *Carmina inepta*.

The riddle, but more perhaps as an amusement for the baronial hall on winter-nights, or for the monastic mess-room, than as a serious intellectual effort, was much cultivated during the middle ages. This character of lively or amusing puzzle it has ever since for the most part retained. Many specimens of what would now be termed 'riddle' or 'conundrum books' exist in French, English, and German collections of manuscripts, and were printed at an early period. One of these, entitled *Demands Joyous*, which may be rendered 'Amusing Questions,' was printed in English by Wynkin de Worde in 1511. Many of these 'joyous demands' are simply coarse jests; but others, again, illustrate the simple, child-like religious belief of medieval Christendom—e. g., Demand: 'What bare the best burden that ever was borne?' Response: 'The ass that carried our Lady when she fled with our Lord into Egypt.' Some are really fitted to excite risibility—e. g., Demand: 'What is that that never was and never will be?' Response: 'A mouse's nest in a cat's ear.'—'What is the worst bestowed charity that one can give?' 'Alms to a blind man; for he would be glad to *see* the person hanged that gave it to him.' The Reformation, at least in Protestant countries, checked, if it did not wholly stop, the merry pastime of riddle-making; but in the 17th c. it began to creep into favour again. Le Père Ménestrier, a learned Jesuit, wrote a grave treatise on the subject; and in France, riddles soon rivalled in popularity the madrigals and sonnets of the period. The Abbé Cotin was a famous fabricator of riddles, and published a *recueil* of his own and those of his contemporaries, preceded by a dissertation, in which he modestly dubbed himself *Le Père de l'Enigme* (The Father of the Riddle); but, as a French critic remarks, posterity has not recognised his paternity. In the 18th c., the taste for the manufacture of riddles continued to increase, and most of the brilliant French *littérateurs*, such as Boileau, Voltaire, and Rousseau, did a little in this line, until, finally, the *Mercure de France* became a fortnightly repository of riddles, the solution of which was sufficient to make a reputation in society. In Germany, Schiller gave a broader development to the riddle. In his hands, it once again became something grave and sibylline, and attained in expression a high degree of literary beauty and force. A good collection of the best riddles is to be found in Ohnesorgen's collection, entitled *Sphinx* (6 vols. Ber. 1833).

RIDGE, the upper angle of a roof, usually covered with lead or zinc, and sometimes with stone or tile. Ridges are often ornamented with a cresting or running design, and recently cast-iron has been much used for this purpose.

RI'DING (Saxon, *trithing*, third part), a term applied to three parts into which the county of York is divided, termed respectively East, West, and North Riding. A similar division existed in several other counties in the Anglo-Saxon period; there were the *laths* of Kent, the *rapes* of Sussex, the *parts* of Lincoln. The trithing, lath, or rape was formed of three or more hundreds, and presided over by a trithing-man or lath-grieve. In *Domesday Book*, we find Yorkshire divided, as at present, into three ridings, and subdivided into wapentakes. See WAPENTAKE.

RIDING-MASTER, an officer in the cavalry, military train, and artillery, whose duty it is to instruct the officers and men in the management of their horses. He is most commonly selected from the ranks; his pay is 9*s*. a day, rising by length of service to 10*s*. 6*d*. and 12*s*.; besides which, he receives £7 per troop per annum for riding-house expenses; and he is believed to make some profit out of this allowance. The riding-master has the relative rank of lieutenant, and, after an aggregate service of 30 years, including at least 15 years as riding-master, he has the right to retire on 10*s*. a day, with the honorary rank of captain.

RIDLEY, NICHOLAS, one of the most noted leaders of the Reformation in England in the 16th century, was a native of Northumberland, and born about the commencement of the century. He was educated at the foundation-school of Newcastle-upon-Tyne, and subsequently at Pembroke Hall, Cambridge. He became a Fellow of this college in 1524, and ultimately President. The spirit of the Reformation had already begun to penetrate the universities both of Oxford and Cambridge. Tyndale and Bilney had taught the new doctrines in the latter place; and Ridley, no less than Cranmer and Latimer, all Cambridge students about the same period, had probably caught something of their spirit. This reforming tendency was greatly strengthened by a tour on the continent of Europe, which he undertook on the completion of his studies. He encountered some of the most active Reformers abroad, and after a three years' absence, he returned, with his principles firmly grounded in favour of the new course of things. He became proctor to the university of Cambridge, and in this capacity protested against the claims of the papal see to supreme ecclesiastical jurisdiction in England. He was also chosen public orator, and, under the patronage of his friend Cranmer, advanced first to be one of the king's chaplains, and then, in 1547, nominated Bishop of Rochester. He distinguished himself by his vehement denunciations of the idolatrous use of images and of holy water, and very soon became one of the most prominent, as he remained one of the most consistent and inflexible supporters of the Reformed doctrines. He joined actively in the measures of Edward VI.'s reign, and on the deprivation of Bonner, Bishop of London, Ridley became his successor, three years subsequent to his elevation to the see of Rochester. In this high position he distinguished himself by his 'moderation, his learning, and his munificence.' He earnestly promoted the Reformation, yet without bigotry or intolerance; he exerted himself in the foundation of Christ's Hospital, and of the hospitals of St Bartholomew and St Thomas in Southwark, the two latter of which have become eminent as schools of medicine—the former as a school of classical and general instruction. He assisted Cranmer in the preparation of the 41 articles, afterwards reduced to 39. On the death of Edward VI., he warmly espoused the unfortunate cause of Lady Jane Grey; and on its speedy failure, and the accession of Mary, his known connection with it, as well as his general activity in the cause of the Reformation, exposed him to the vengeance of the papal party, again ascendant. He was committed to the Tower in 1553, and in the subsequent year, when a convocation was convened at Oxford for the discussion of the doctrine of transubstantiation, he was removed thither along with Cranmer and Latimer, in order that he might engage in the discussion. It was not to be expected, however, that any good would issue from such a step as this. The discussion proved a mere pretence; the Reformers were adjudged defeated and obstinate heretics, and condemned to suffer at the stake. On the 16th October 1555, R. was led forth to execution, along with his friend and fellow-reformer, Latimer. He suffered

in front of Baliol College, cheerful, steadfast, and consistently enduring as he had been throughout his life. He was, according to Burnet, one of the ablest of all who advanced the Reformation in England. His character is pure, elevated, and self-denying. Foxe says of him he was 'wise of counsel, deep of wit, benevolent in spirit.' His gentleness wins our sympathy, while his scholarly and calm intrepidity excite our admiration.

RIENZI, COLA DI, the famous Roman tribune, was born at Rome in 1313. His parentage was humble, his father being a tavern-keeper, named Lorenzo (by abbreviation, Rienzo), and his mother a washerwoman. Until his twentieth year, he lived among the peasants of Anagni; then he returned to his native city, where he studied grammar and rhetoric, read and re-read the Latin historians, philosophers, and poets (Greek was scarcely yet known in Italy), and excited his imagination, while at the same time he coloured his speech, with the prophetic enthusiasm of the inspired writers. The assassination of his brother by a Roman noble, whom he found it impossible to bring to punishment, is considered to be the incident that finally determined him to deliver the city, as soon as he was able, from the barbarous thraldom of the barons. He assumed the significant title of 'consul of orphans, widows, and the poor.' In 1343, he was appointed by the heads of the Guelph party spokesman or orator of a deputation sent to the papal court at Avignon to beseech Clement VI. to return to Rome in order to protect the citizens from the tyranny of their oppressors. Here he formed a close friendship with Petrarch, through whose assistance he obtained a favourable hearing from his Holiness, who appointed him notary to the City Chamber. In April 1344, R. returned home, and sought to obtain the countenance of the magistrates in his ideas of reform; but reform, he found, was impossible without revolution; yet he did not *conspire*, properly speaking, to the very last moment. During three years, he loudly and openly—perhaps even ostentatiously—menaced the nobles, for the enthusiasm of R. for a nobler and juster government, though sincere, was showy and vain. The reason why the nobles took no steps to crush him was because they thought him mad. At last, when R. thought he could rely on the support of the citizens, he summoned them together on the 20th of May 1347, and surrounded by 100 horsemen and the papal legate, he delivered a magnificent discourse, and proposed a series of laws for the better government of the community, which he termed *il buono stato*, and which were unanimously approved of. The aristocratic senators were driven out of the city, and R. was invested with dictatorial power. He took the title of 'tribune of liberty, peace, and justice,' and chose the papal legate for his colleague, but reserved to himself the direction of affairs, after having, however, suggested the institution of a syndicate, to which he should be responsible. The pope confirmed the eloquent dictator in his authority; all Italy rejoiced in his success, and foreign lands, even warlike France (according to Petrarch), began to dread the reviving majesty of the Eternal City. A bright dream now seems to have flashed across R.'s imagination—the unity of Italy and the supremacy of Rome! Every great Italian has dreamed that dream from Dante to Mazzini. R. despatched messengers to the various Italian states, requesting them to send deputies to Rome to consult for the general interests of the Peninsula, and to devise measures for its unification. These messengers were everywhere received with enthusiasm, and on the 1st of August 1347, two hundred deputies assembled in the Lateran Church, where R. declared that the choice of an emperor of the Holy Roman Empire belonged to the Roman people, and summoned Ludvig of Bavaria and Karl of Bohemia, who were then disputants for the dignity, to compear before him. The step was wildly impolitic. R. had no *material* power to enable him to give efficacy to his splendid assumption. The pope was indignant at the transference of authority from himself to his subjects; and the barons, taking advantage of certain ceremonial extravagances which the dictator had committed, and which had diminished the popular regard for him, gathered together their forces, and renewed their devastations. After some ineffectual resistance, R. resigned his functions, weeping all the while, and withdrew from Rome, which was entered by the barons two days after. His tenure of power had lasted only seven months. In the solitudes of the Neapolitan Apennines, where he found refuge, R. would seem to have recovered his enthusiasm and his faith. Regarding his fall as a just chastisement of God for his love of worldly vanities, he joined an order of Franciscan hermits, and spent nearly two years in exercises of piety and penitence—all the while, however, cherishing the hope that he would one day 'deliver' Rome again. This ambition to play a distinguished part made him readily listen to a brother-monk, who, about the middle of 1350, declared that, according to the prophecies of Joachim of Flores, of Cyrillus, and of Merlin, R. was destined, by the help of the emperor Karl IV., to introduce a new era of happiness into the world. R. betook himself at once to Prague, and announced to the emperor that in a year and a half a new hierarchy would be established in the Church, and under a new pope, Karl would reign in the West, and R. in the East. Karl, not knowing very well what to say in reply to such language, thought it safest to put the 'prophet' in prison, and then wrote to inform his friend the pope of the matter. In July 1351, R. was transferred to Avignon, where proceedings were opened against him in reference to his exercise of tribunitial power. He was condemned to death, but his life was spared at the earnest entreaties of Petrarch and others; and the next two years were spent in an easy confinement in the French papal city. Meanwhile the state of matters at Rome had become worse than ever. The great families were even more factious, more anarchical, more desperately fond of spilling blood than formerly; and at last Innocent VI. sent Cardinal Athornoz to re-establish order. R. was also released from prison, and accompanied the cardinal. A residence was assigned him at Perugia; but in August 1354, having borrowed money, and raised a small body of soldiers, he made a sort of triumphal entry into Rome, and was received with universal acclamations. But misfortune had impaired and debased his character; he abandoned himself to good living, and his once generous sentiments had given place to a hard, mistrustful, and cruel disposition. The barons refused to recognise his government, and fortified themselves in their castles. The war against them necessitated the contraction of heavy expenses; the people grumbled; R. only grew more severe and capricious in his exactions and punishments. In two months his rule had become intolerable, and on the 8th of October, an infuriated crowd surrounded him in the Capitol, and put him to death with ferocious indignities.

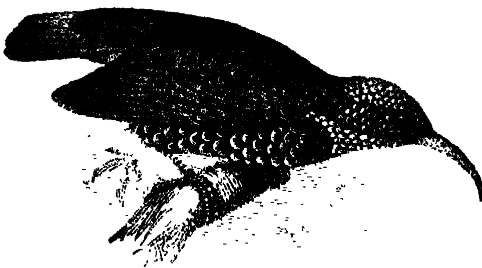
RIE'SENGEBIRGE (giant mountains), a mountain range about 23 miles long by about 12 miles broad, between Bohemia and Prussian Silesia. See BOHEMIA.

RIE'TI (ancient, *Reate*), a city of Central Italy,

in the province of Perugia in Umbria, is situated at the foot of a hill, on the banks of the Velino, 45 miles north-east of Rome. It is walled, its streets are regular, and it has a fine cathedral, and many benevolent institutions. It is the seat of an archbishop. R. was a noted city of the Sabines. Pop. 14,224.

RIFF, The, a portion of the coast of Morocco which extends from Tangier on the west to near the western frontier of Algiers, having a length of about 210 miles, with a breadth of 58. The name, in the Berber language, which is that of the inhabitants, signifies a mountainous and rugged coast. The Riff mountains, which stretch along near and parallel to the coast, are green and wooded, and are here and there intersected transversely by fertile valleys or deep ravines, each of them possessing its brook or rivulet, which descends to the Mediterranean. The R. region is separated from the parallel mountain chain south of it by an extensive, fertile, and well-watered plain, in which stands the city of Fez. The inhabitants of the R. are almost wholly Berbers, who are employed in feeding and breeding cattle, fishing, and occasional piracy. On account of the injuries inflicted by them on merchant vessels, most of the maritime states of Europe agreed to pay an annual sum as quit-money. However, in 1828, Austria declined further payment of the tax. A Venetian vessel was seized by the pirates, in the harbour of Rabat, but the arrival of an Austrian fleet off the port produced restitution of the ship and its cargo, as well as the formal renunciation of all further claims. France followed the same course by declaring war against the Sultan of Morocco, and obtained compensation, in 1844, since which period piracy has much diminished. Its example was followed by the Spaniards in 1859. The sultan, however, had always discountenanced piracy, but his authority in the R. was too weak to compel obedience.

RIFLE-BIRD (*Ptiloris Paradiseus*), a bird of the family *Upupidæ*, with a long curved bill, and in size about equal to a large pigeon. It inhabits the south-eastern districts of Australia, and is found only in very thick 'bush.' The male is regarded as more splendid in plumage than any



Rifle-Bird (*Ptiloris Paradiseus*).

other Australian bird. The upper parts are velvety black, tinged with purple; the under parts velvety black, diversified with olive-green. The crown of the head and the throat are covered with innumerable little specks of emerald green, of most brilliant lustre. The tail is black, the two central feathers rich metallic green.

RIFLED ARMS were invented for the purpose of remedying certain defects essentially connected with cylindrical smooth-bore guns. These defects, which are chiefly owing to atmospheric resistance, shewed themselves in the erratic motion of the ball, especially when fired at a long range, and arose from the following causes: *First*, The ball never fitted tightly, and, in consequence of this, its centre was below the centre of the bore. A portion of the explosive force of the powder escaped over the top of the bullet, and was not only wasted, but exercised a downward pressure on the ball, tending to squeeze it *into* the under side of the barrel, and so great was this pressure, that in guns of soft metal, as brass, a perceptible dint was produced after a few rounds. Another and more important consequence of the looseness of the ball was, that the action of the powder on it was necessarily irregular, and its resulting motion along the barrel was a series of oblique impacts, now against one side, now against the other, and the direction of its motion after expulsion was necessarily not in line with the axis of the barrel, and depended upon the side of the barrel with which it was last in contact. *Secondly*, Balls can never be perfectly homogeneous, and the violent and sudden pressure of the exploded powder produces a slight change of shape; consequently, the centre of gravity can never accurately coincide with the centre of the sphere, the air resists its forward motion unequally, and true flight is precluded. *Thirdly*, As a consequence of the friction of the ball against the sides of the barrel, it acquires a rotatory motion, the direction of its rotation after expulsion being determined by the particular point of the muzzle with which it was last in contact. Thus, if it finally touched the top or bottom of the muzzle, the plane of rotation of the anterior surface of the ball would be in line with its progressive motion, and the rotation would be in an upward or downward direction; if it last rebounded from the right side, the plane of rotation would be in line with its path, and the rotation of the anterior surface from left to right, and so on. The ball, in its rapid flight, compresses the air in front, and produces a vacuum behind; the denser, because more compressed, air in front, attempts to rush round the sides of the ball to fill up the vacuum. Now (see fig. 1), let us suppose that the ball, while in rapid advance, is also revolving in a horizontal plane, and from left to right, the side A, whose rotation *conspires with* the motion of translation, resists, by its friction, the attempt of the air to reach the vacuum by that side; while the side B, whose rotation is against the motion of translation, conspires to aid the air in reaching the vacuum. It follows from this, that the air is denser in front of A than in front of B; its resistance on the side A is greater than that on B, and the ball, in consequence, is deflected towards the side on which the resistance is least (towards the right in this instance). If the ball struck the top of the muzzle, its revolution would be in a vertical plane in line with the barrel, and in an upward direction, under which circumstances the ball would tend, first, downwards from the first reason, and then upwards from the third; while, if it struck the bottom of the muzzle, the contrary would be the case. These aberrations of the ball from its true theoretical path, as was evident to artillerists, could never be wholly annihilated while smooth-bores

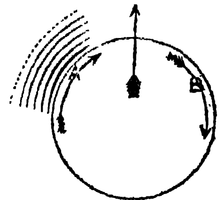


Fig. 1.
Horizontal section of a spherical bullet, the straight arrow shewing the direction of its forward motion or *motion of translation*, and the curved arrows that of its motion of rotation. The ball, in this instance, is supposed to have struck against the *right* side of the muzzle.

were used, and they set themselves to discover how they might be counteracted. It occurred to them that this could best be managed by securing that the plane of rotation of the ball should be at right angles to its motion of translation, as the irregularities in its structure, which produce aberrations of the first and second kind, would thus act equally in all directions, producing an exact counterbalance, while the aberration from the ball's rotation would wholly disappear; and the constancy of the vertical transverse position of the plane of the ball's rotation was obtained by making one or more spiral grooves along the interior of the barrel.

As early as 1498, the citizens of Leipzig possessed the germ of the future rifle, for their arms had a grooved bore, but the grooves were straight. Not many years after, in 1520, Augustin Kutter (or Koster) of Nürnberg was celebrated for his rose or star-grooved barrels, in which the grooves had a spiral form. It took its name from the rose-like shape of the bore at the muzzle; and, setting aside superiority of workmanship subsequently developed, Kutter's arm was the veritable rifle, and to him, therefore, so far as history shews, is due the invention of this terrible weapon, which reduces the flight of the projectile to a question of the individual skill of the marksman. The spiral groove gives to the bullet, if it fits into the grooves, a rotation rapid in proportion to the force of the explosion and the sharpness of the twist in the spiral. This revolution of the bullet on its own axis keeps that axis, gravity excepted, in the line in which it leaves the piece. In 1628, Arnold Rotsiphen patented a new way of 'makeing gonnes,' which, from a subsequent patent granted him in 1635, appears to have consisted, among other improvements, in rifling the barrels. It would be tedious to enumerate the various principles of rifling which were tried during the two centuries following Rotsiphen—suffice it to say, that scarcely a form of rifling now prevails but had its prototype among the old inventions. The difficulty of mechanical appliances making the rifling true, deferred, however, their general introduction, and the cost of rifled arms limited their use to the purposes of the chase. The revolutionary government of France had rifles issued to portions of their troops, but they met with so indifferent a success that Napoleon recalled them soon after he came to power. In the Peninsula, however, picked companies of sharpshooters practised with rifles with deadly effect on both the English and French sides. During the American war, 1812—1814, the Americans demonstrated incontestably the value of rifles in warfare; but many years were yet to elapse before they were definitively placed in the hands of soldiers, many of those of every nation in the Crimea having fought with the ineffective and almost ridiculous 'Brown Bess.' Soon after the French invaded Algeria, they had armed the Chasseurs d'Orleans with rifles, to counteract the superior range of the Arab guns. The inutility of the old musket was shewn in a battle during the Kaffir war, where our men discharged 80,000 cartridges, and the loss of the enemy was 25 men struck. After experiments with the old musket, it was found that its aim had no certainty whatever beyond 100 yards. It was soon discovered that a spherical ball was not the best missile; one in which the longer axis coincided with the axis of the gun flying truer—the relative length of the axis and the shape of the head being matters of dispute. The first war-rifle was that of Captain Delvigne, proposed in 1826, and adopted for a few men in the French army; but this still included the old and rude plan of forcing the leaden ball through the grooves by blows of the ramrod, it being of course requisite that the projectile should occupy the grooves tightly. In 1842, Colonel Thouvenin invented a *carabine à tige*, in which the breech had a small pillar screwed into it, round which the powder lay, and on the end of which the bullet rested, its base being flattened out by the force of the ramrod. Colonel Delvigne added a conical bullet to this rifle, and the combined invention was issued to the Chasseurs d'Afrique in 1846. But the *tige*, or pillar, became bent by usage, and was found otherwise objectionable. It was superseded by using with a grooved barrel the Minié bullet, which, being made smaller than the bore of the piece, could be almost dropped into the barrel. It was of lead, and in its base it contained a conical recess, to receive the apex of a smaller iron cup (A). The force of the explosion drove this cup into the bullet, causing the lead to expand into the grooves of the barrel. (It is right, however, to state that this contrivance is claimed for a Mr Greener as early as 1836.) The Prussians, meanwhile, had armed their troops with the needle-rifle (*Zündnadelgewehr*), which is still in use. In England, however, no improvement took place until 1851, when 28,000 rifled muskets to fire the Minié bullet were ordered to be issued. Notwithstanding the many advantages of the Minié system, it was found defective in practice. The rifle fouled quickly, and sometimes the iron cup went beyond expanding the lead, by being driven completely through it, leaving the bullet a mere distorted tube, which sometimes remained firmly fixed in the barrel.

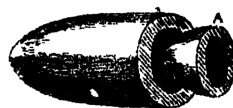


Fig. 2.—Minié Bullet.

Experiments were set on foot in all directions, and resulted in 1853 in the production of the Enfield rifle, which had three grooves, taking one complete turn in 78 inches, and fired a bullet resembling the Minié, except that a wooden cup was substituted for one of iron. This rifle is stronger than its predecessor, while its weight with 60 cartridges is 3 lbs. less, a matter of no small moment to the soldier. Its diameter is ·577 of an inch, its bullet weighs 530 grains, and ranges with great accuracy for 800 yards, and fairly up to 1100. Since 1853, this has been the weapon of the British army; and although beaten in execution by the Whitworth, Lancaster, and some other rifles, it is incontestably the best for precision of fire with which any army has to this time been equipped; but its system of rifling is only the system long in use. The vast manufactory at Enfield (see SMALL ARMS FACTORY) enables many thousand rifles to be turned out annually, so exactly made in all their parts as to be absolutely interchangeable. As, however, the results were not entirely satisfactory, government confided to Mr Whitworth, a very celebrated mechanician, the task of arriving, by inductive reasoning, at the best form of rifling. After protracted and most careful experiments, he concluded to dispense entirely with the old grooves and lands, and substituting for this a polygonal bore, with a twist towards the muzzle. He selected the hexagon as the most suitable polygon, and reduced the bore to ·451; used a projectile fitting mechanically to the bore; took one turn for his spiral in 20 inches; and, as a result, reduced the height of the trajectory to 8½ feet

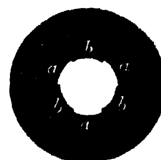


Fig. 3.—Section of the Enfield Rifle.
a, groove; *b*, land.

instead of 11 in the Enfield, while he obtained a steady and accurate flight of 2000 yards and upwards. Mr Lancaster, by other reasoning, had previously abandoned grooves for a uniform elliptical bore with a spiral (see LANCASTER RIFLE).

Various other systems have from time to time been proposed by Mr Westley Richards, Mr Terry, and other eminent gunmakers; but the Enfield grooves, the Whitworth polygon, and the Lancaster ellipse, will probably remain the representative guns of the different classes, and between them the ultimate victory will probably lie.

As with small-arms, so with cannon, rifling is no new discovery. In the Museum at St Petersburg is a cannon which was rifled in nine grooves as early as 1615. In 1661, the Prussians experimented with a gun rifled in 13 shallow grooves. By 1696, the Germans had tried elliptical bores. From thence till 1833, many attempts were made to rifle cannon, with more or less success; but although the firing of smooth-bore guns was as aberrant as that of smooth-bore muskets, and from greater range even more so, yet, since the gunners were safe from musketry-fire at 200 yards, and the cannon could be directed against masses of men with tolerable certainty up to 600, there was no special inducement to improve their powers. But the introduction of rifled small-arms changed the relative advantages; for an Enfield rifle might pick off the gunners of a smooth-bore cannon before their weapon could come into effective play. In 1833 and 1836, Monsieur Montigny of Brussels tried rifled guns with considerable success. In 1845, Colonel Cavalli of the Sardinian service commenced experiments with his rifled cannon: two Swedish officers—Baron Wahrendorf and Lieutenant Engstroem—next produced rifled cannon; but none of these systems were permanently adopted. The Crimean war set inventors vigorously at work, and many admirable guns have resulted from their attempts, the great difficulty of the day being to decide which is most effectual. The first point was the metal; and here cast-iron was found quite useless, being incapable of resisting the explosion of the large charges necessary to force closely fitting projectiles through rifled barrels. Several plans were resorted to. Sir William Armstrong welds coils of wrought-iron round a mandrel into one homogeneous mass of extraordinary tenacity, which he again strengthens by similar rings round the breech. Mr Whitworth forces rings of wrought-iron over the barrel by hydraulic pressure: Captain Blakely strengthens a barrel of longitudinal bars welded together by shrinking wrought-iron bands over it. The French rifle brass guns and use small charges; having also guns of wrought-iron. The Austrians have made a new bronze alloy, which has proved extremely strong; the Belgians have tried Bessemer's steel. The system of rifling was the next important matter. Mr Lancaster adhered to his oval bore; Sir William Armstrong produced a bore rifled in a great number of small sharp grooves (this gun was adopted by the British government); Mr Whitworth retained a hexagonal bore; and the French government adopted a bore with two, and subsequently three rather deep spiral grooves. After careful experiments, the Austrian, Spanish, Dutch, and Italian governments have concurred in the French system. These several bores are shewn below in section. In the Armstrong, the rotation is communicated to the projectile by the latter being cased with lead, which the explosion forces into the grooves. The numerous fine grooves impart a very correct centering to the shot, and give extreme accuracy of range; but they render the gun a delicate weapon, and they preclude the occasional firing of round shot or canister, which would destroy the grooves. In the Whitworth, the shot is constructed to pass freely through the spiral hexagonal bore, windage being

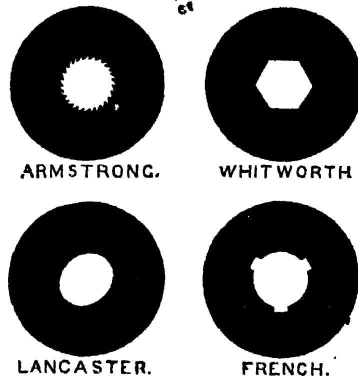


Fig. 4.
(The Ellipse of the bore in the Lancaster is exaggerated to shew the principle.)

prevented by a greased wad, which is said to foul the piece considerably. Lancaster's shot are elliptical, to correspond with the bore; they are simple and accurate; but there is some danger that they will jam in the gun, and cause it to burst. The French projectiles have ribs of projecting metal to correspond to the grooves, and are very effective, the system having the concomitant advantage of being able to fire ordinary shot without material injury to the gun. To sum up: the Armstrong gun is the most accurate, that and the Whitworth have the longest range, each having attained 5½ miles; the Lancaster fouls least; the French is simplest, and can fire ordinary cannon-balls, canister, or case.

Although the Armstrong gun was officially adopted into the British service in 1859, as the best weapon then known, the competition is still open, and it is uncertain at this moment (1865) whether it may not be superseded by the Whitworth. In 1864, Mr Mackay of Liverpool produced a gun on quite a new principle, called his 'windage-gun,' the effects of which, as regards range, precision, and penetration, have been very remarkable. His bore is rifled with small grooves, but the projectile is not made to fit into the grooves, a rapid revolution being imparted to it by the rush of gas through the grooves, and therefore around its circumference during the explosion.

The projectiles used with the various guns will be described under SHELL and SHOT.

RIFLEMEN are troops armed with rifles, and employed more or less as sharpshooters. The name now has nearly lost all meaning, for the whole infantry are now riflemen; but a few years ago—i. e., as late as 1854, the riflemen were quite the exception, the army generally having the smooth-bore 'Brown Bess.' There were at that time only two line regiments of Rifles, the 60th and the Rifle Brigade, with 2 colonial regiments of infantry (Canadian Rifles and Ceylon Rifles), and one Hottentot regiment of mounted infantry (the Cape Mounted Rifles). The establishment of Rifle regiments was taught to the British by the Americans and French, from the sharpshooters of both of which nations our armies suffered severely. During the French war, the 60th and 95th Regiments were armed as riflemen, taught light infantry drill, and clothed in dark green, to be as invisible as possible. The 95th became the Rifle Brigade. Experiment has since shewn that gray is

less conspicuous than green as a uniform, whence its adoption by many Volunteer corps.

The Volunteer riflemen of Great Britain will be described under VOLUNTEERS.

RI'GA, a most important seaport of Russia, capital of Livonia, and the centre of administration for the three Baltic Provinces, stands mainly on the right bank of the Dwina, 5 miles from the mouth of that river, in the Gulf of Riga. It is 376 miles south-west of St Petersburg, and is the terminus of a railway to Moscow, not yet (1865) completed. From the steeple of St Peter's Church, said to be the highest in the empire, a full view of the situation of the city is obtained. R. contains a number of striking and handsome public buildings, of which the castle, or Dom, built in 1204, now the residence of the governor-general of the three Baltic Provinces, is the chief. The Dwina is crossed by a bridge of boats, 800 paces long, of which the boats in the middle are movable, to allow of the passage of vessels, and which is entirely removed in winter. The old town is dark and gloomy, and shews all the main features of a German town of the middle ages; but the extensive suburbs are modern and handsome, and the whole is defended by ramparts, bastions, and other fortified works. R. is the second trading town in Russia. It contains numerous soap, candle, glass, and iron works; cloth, leather, sugar, and tobacco factories, and rope-walks. Shipbuilding is extensively carried on in the town and vicinity. The principal articles of export are flax, hemp, linseed, corn, timber, tallow, and tobacco. In 1863, the exports amounted to £3,348,550, and of this sum the chief items were: flax, £1,380,000; hemp, £600,000; and linseed, £420,000. The imports do not exceed £853,000, the principal articles being fish and salt. In 1863, the value of the export trade to Great Britain was £1,812,705, being considerably more than half the entire export trade. The import trade from Great Britain, in 1863, valued £293,250, or a third of the whole imports. Of the 3506 vessels, of 570,170 tons, that entered and cleared the port in 1863, 726 vessels, of 148,690 tons, were British. Pop. 73,953.

R. was founded in the beginning of the 13th c. by Albert Buckshoevden, Bishop of Livonia, and soon became a first-rate commercial town, and member of the Hanseatic League. The Teutonic Knights possessed it in the 16th century. In 1621, R. was taken by Gustavus Adolphus, and held under Swedish dominion till 1710, but was finally annexed to Russia in 1721.

RIGA, GULF OF, an inlet in the north-east of the Baltic Sea, washes the shores of the three Baltic Provinces, Courland, Livonia, and Esthonia. It is over 100 miles in length from north to south, and is about 70 miles in breadth. The islands of Oesel, Dagö, Mohn, and Worms stand in the entrance to it, and narrow the mouth of the gulf to a passage about 20 miles in width. The chief river which falls into the gulf is the Dwina. Sandbanks render navigation in some parts dangerous.

RIGGING, in a ship, is a combination of very numerous ropes to afford stability to the masts, and to lower and hoist the sails. Notwithstanding the complication which the cordage of a rigged ship presents at first sight to the eye, the arrangement is remarkably simple. In all substantial points, the rig of each mast is the same; to understand one is, consequently, to understand all. In the accompanying diagrams, the same notation is observed throughout, spars being shewn by capital letters; sails, by italic letters; *standing* rigging, by Roman numerals; and *running* rigging, by Arabic numerals. To avoid a confusing number of symbols and needless repetition, the corresponding ropes, &c., on each mast bear the same numbers, and in the key, the name of such rope *per se* is only given. To find the full title of a rope, it is necessary to prefix (unless it pertain to the bowsprit or gaff) the name of the mast (mizzen, main, or fore) to which it belongs. For example, the spars marked D are, counting from the left, called respectively mizzen-royal-mast, main-royal-mast, and fore-royal-mast; the standing-ropes marked IV., are the mizzen-stay, main-stay, and fore-stay; and the running-ropes bearing the figure 5, are mizzen-braces, main-braces, and fore-braces.

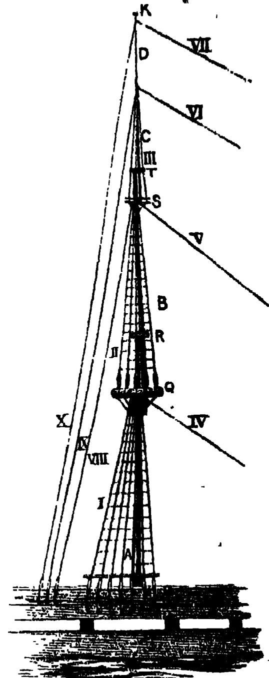


Fig. 1.

Rigging is either *Standing* or *Running*. The former is employed in maintaining, in fixed position, the masts and bowsprit; the latter runs freely through numerous blocks, and its functions are to raise and lower the upper masts and the yards, to trim the sails, to hoist the signals and other flags, and occasionally to furl the sails.

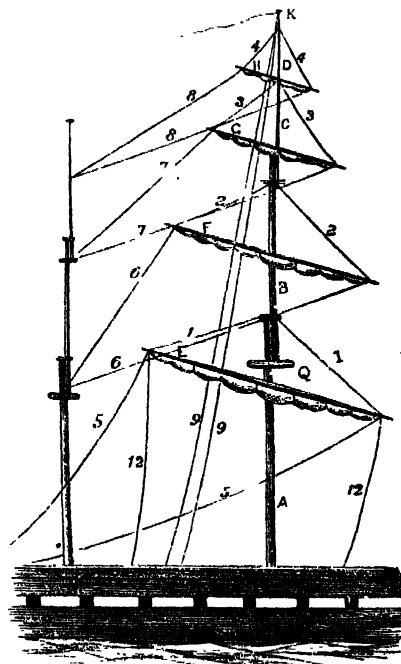


Fig. 2.

Each mast has the following standing rigging: at each side, *shrouds* (I., II., III.), consisting of several very thick (usually plaited) ropes; in front, the *stay* (IV., V., VI., VII.); and behind, the *backstays* (VIII., IX., X.), coming down to the ship's sides behind the shrouds. Across the lowermast and topmast shrouds, thin ropes, called ratlings, are hitched horizontally, and form convenient ladders for the men to use in going aloft. The standing rigging of the lower mast reaches the chains on the ship's sides; while the shrouds of the topmast and topgallantmast are worked into the top, their stays to the tops of the masts nearer the bow in each case (the bowsprit serving as an anterior mast for the fore-rigging); all the backstays, however, are brought down to the ship's sides. In steamers, the mainstays require modification, in order to avoid the funnel; they are often adjusted on a plan similar to that of the backstays. The standing rigging of the bowsprit consists of the bobstays (XIV.), generally of chain; the martingale stays (XI., XII.), and martingale backstays (XIII.), which all exert an adverse pressure to that of the stays from the foremast, topmast, &c.

The *running* rigging is of four classes: 1. Lifts for the upper masts and the jib-boom. These are not shewn in the diagrams, from the fact that they run parallel, and closely contiguous to the masts, topmasts, and bowsprit.

2. The lifts for the yards and sails. Each yard has two lifts, one proceeding from a point near either extremity, and passing through a pulley at the head of that section of the mast to which the sail or yard belongs. They are worked either on the deck or in the top. The yard-lifts are shewn by the numbers 1, 2, 3, 4. The gaff and boom have separate lifts working into the mizzen-top (13, 15). Each jib-sail has a lift (not shewn), which acts parallel and close to IV., V., 10, or 11. If the ship carry stay-sails, there will be lifts parallel to the main and mizzen topmast stays and higher stays.

3. The ropes for adjusting the sails when spread. These comprise, first, the sheets for hauling down the lower corners of each sail—specimens are shewn

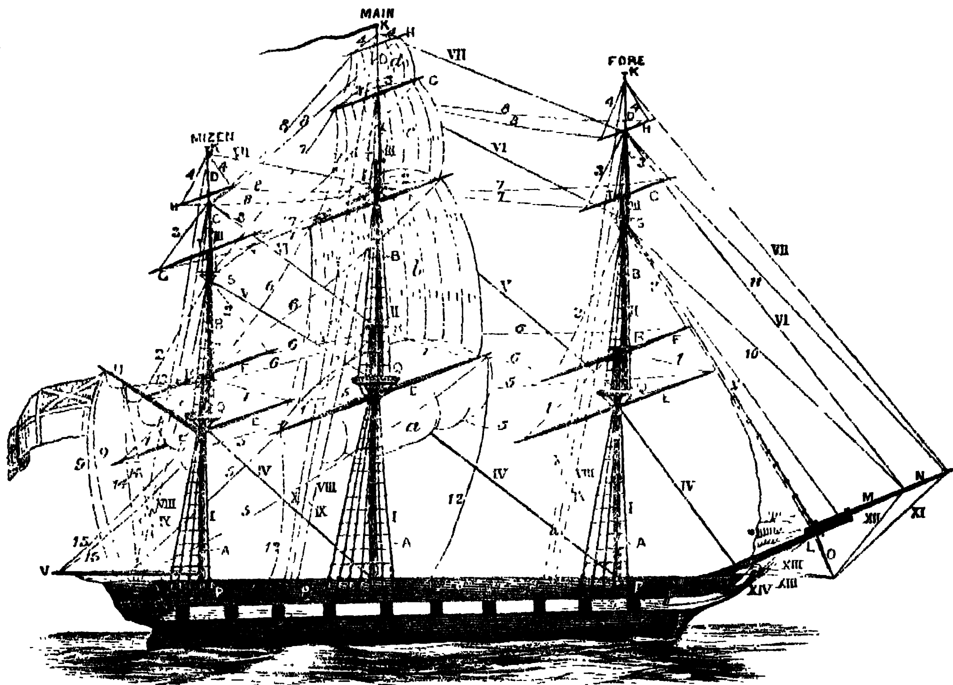


Fig. 3.

Spars, &c.—A, Mast; B, Topmast; C, Topgallantmast; D, Royal-mast; E, Yard; F, Topsailyard; G, Topgallantsail-yard; H, Royal-yard; K, Truck; L, Bowsprit; M, Jib-boom; N, Flying Jib-boom; O, Martingale; P, Chains; Q, Top; R, Cap; S, Crosstrees; T, Topmast Cap; U, Gaff; V, Boom, or Spanker-boom.
Sails.—*a*, Mainsail; *b*, Topsail; *c*, Topgallantsail; *d*, Royal; *e*, Spanker.
Standing Rigging.—I. Shrouds; II. Topmast Shrouds, crossed by Ratlings; III. Topgallant Shrouds; IV. Stay; V. Topmast Stay; VI. Topgallantmast Stay; VII. Royal Stay; VIII. Topmast Backstay; IX. Topgallantmast Backstay; X. Royal Backstay; XI. Flying Jib-boom Martingale Stays; XII. Jib-boom Martingale Stays; XIII. Martingale Backstays; XIV. Bobstays.
Running Rigging.—1, Lifts; 2, Topsail Lifts; 3, Topgallantsail Lifts; 4, Royal Lifts; 5, Braces; 6, Topsail Braces; 7, Topgallant Braces; 8, Royal Braces; 9, Signal Halyards; 10, Jib-stay; 11, Flying Jib-stay; 12, Sheet; 13, Peak Halyards; 14, Vangs; 15, Topping Lifts.

at 12; secondly, the braces for turning the yards about, to trim the sails to the wind. Each yard has two braces, one from either end passing to an adjoining mast, except the main braces, which are brought to the ship's side near the stern. The braces are shewn as Nos. 5, 6, 7, 8. The vangs and spanker sheet (14, 16) perform similar offices for the spanker. There are minor ropes in connection with the sails, for assisting in furling, reefing, spreading, &c.; but it would have rendered the diagram too complicated to have inserted them.

4. Ropes in connection with the flags. Each mast has at its head a *truck*, containing two or more small pulleys. Over each of these, a thin halyard is passed, and brought down double to the deck. On these, any required flag is rapidly bent and hoisted with great ease. There are two pair of similar halyards to the gaff-peak; and when the

ship is to be decorated on any festive occasion, similar halyards are affixed to the end of each yard-arm.

In different classes of ships, slight modifications occur in the rigging, to suit particular circumstances, but the main principles of rigging are as detailed above for all sizes of decked vessels. See SAILS.

RI'GHI, a mountain of Switzerland, in the canton of Schwyz, between Lakes Lucerne, Zug, and Lowerz, is isolated, and commands extensive views of some of the finest Swiss scenery. It is easily accessible; four mule-paths lead to its summit, which, though it forms an admirable natural observatory in favourable weather, is only 5676 feet above the sea. Verdant pastures clothe the entire summit, and the slopes are belted with forests. Crowds of tourists, of both sexes, ascend the R. every season, in order to enjoy the fine views (especially that of sunrise), which, in clear weather, it commands. There is a large hotel at the top, where tourists pass the night, in order to see the sunrise.

RIGHT, in Legal language, is that kind of interest or connection with a subject-matter which serves as a foundation for an action or suit, or other protection of a court of law or equity; and hence it means an interest that can be enforced, for if it is such as a court of law or equity cannot take notice of, it may be called a natural or moral, but it is not a legal right. Strictly speaking, right merely means a relation between external nature and some person or other, and therefore there is no such thing as abstract rights, for a right is only intelligible when predicated of some person who can exercise or enforce it. There is an old practical division of all rights into rights of the person and rights of things. In the former class are included such divisions as rights of personal security and liberty; rights connected with marriage, infancy, &c.; while in the latter class are included the general rights arising out of the possession of real and personal property. There are various subjects which do not fall under either division exclusively; indeed, none of the usual divisions of rights can be said to be more than vaguely descriptive of their subjects. It might naturally be expected that the correlative legal expression for rights should be wrongs, but this is not the case, the word wrong being used technically to mean only that class of infringements of one's rights which are connected with the person or the personal use of property. Thus, the refusing or withholding payment of a debt is not correctly called a legal wrong; but an assault or injury to one's person, or to one's property, irrespective of any contract, is properly called a wrong or a tort. The word right is also used, more or less technically, in a narrower sense. An action, called a writ of right, had for its object to establish the title to real property; but it was abolished, the same object being secured by the order of ejectment. A *petition of right* is a proceeding resembling an action by which a subject vindicates his rights against the crown, and recovers debts and claims, the first step being a petition, which is allowed by the home secretary, and referred for trial to a court of law. A *right of way*, is a right of a private owner or occupier to a way over the land of an adjoining proprietor, as incidental to his possession of a house, or premises, or land. *Right of action*, means simply a right to commence an action in one of the courts of law to recover damages or property. *Right of common*, means a right of one, who is not the owner or occupier of waste land, to send cattle to graze upon it, or to cut turf, or exercise some partial right of property over it. *Right of entry*, is a right to possess and use land or premises, &c.

RIGHTS, DECLARATION AND BILL OF. The convention which called the Prince and Princess of Orange to the throne of England, set forth, in a solemn instrument known by the name of the *Declaration of Rights*, those fundamental principles of the constitution which were to be imposed on William and Mary on their acceptance of the crown. This declaration, drawn up by a committee of the Commons, of which Mr (afterwards Lord) Somers was chairman, and assented to by the Lords, began by declaring that King James II. had committed certain acts contrary to the laws of the realm. The king, by whose authority these unlawful acts had been done, had abdicated the throne; and the Prince of Orange having invited the estates of the realm to meet and deliberate on the security of religion, law, and freedom, the Lords and Commons had resolved to declare and assert the ancient rights and liberties of England. It was therefore declared, that the power of suspending and of dispensing with laws by regal authority is illegal; that the commission for creating the late Court of Commissioners for Ecclesiastical Causes, and all commissions and courts of the like nature, are illegal; that the levying of money for the use of the crown by prerogative, without grant of parliament, is illegal; that it is the right of the subjects to petition the king, and all prosecutions for such petitioning are illegal; that the raising or keeping of a standing army in time of peace, except with consent of parliament, is illegal; that Protestant subjects may have arms for their defence; that the election of members of parliament should be free; that freedom of speech in parliament should not be questioned in any place out of parliament; that excessive bail ought not to be required, or excessive fines imposed, or cruel or unusual punishments inflicted; that jurors should be duly impanneled, and that jurors in trials for high treason should be freeholders; that grants and promises of fines and forfeitures before conviction are illegal; and that for redress of all grievances, and the amendment, strengthening, and preserving of the laws, parliaments ought to be held frequently. All these things the Lords and Commons claimed as their undoubted rights and liberties; and having done so, they resolved that William and Mary should be king and queen of England for their joint and separate lives, the administration being during their joint lives in William alone; and that on their decease the crown should descend to the issue of the queen, then to that of Anne and her posterity, and, failing them, to the issue of William.

This Declaration of Rights was presented to the Prince and Princess of Orange at Whitehall, and accepted by them along with the crown. Being originally a revolutionary instrument, drawn up in an irregular assembly, it was considered necessary that it should be turned into law. The Declaration of Rights was therefore brought forward in the parliament, into which the convention had been turned, as a Bill of Rights, and passed the Commons; but an amendment proposed in the Lords regarding the settlement of the crown on the issue of the Princess Sophia, in the event of Mary, Anne, and William all dying without issue, led to several ineffectual conferences between the two Houses, which ended in the measure being dropped. The bill was, however, reintroduced in the following session of parliament (1689) without the proposed amendment, when it passed both Houses, and obtained the royal assent—a clause, however, being added, which originated in the House of Lords, to the effect that the kings and queens of England should be obliged,

on coming to the throne, in full parliament or at the coronation, to repeat and subscribe the declaration against transubstantiation, and that a king or queen who should marry a papist would be incapable of reigning in England, and his subjects would be absolved from their allegiance.

RIGHTS OF MAN, a famous statement of rights, principally drawn up by Dumont, author of the *Souvenirs de Mirabeau*, and solemnly adopted by the French National Assembly on the 18th August 1789. It declares that all mankind are originally equal; that the ends of the social union are liberty, property, security, and resistance to oppression; that sovereignty resides in the nation, and that all power emanates from it; that freedom consists in doing everything which does not injure another; that law is the expression of the general will; that public burdens should be borne by all the members of the state in proportion to their fortunes; that the elective franchise should be extended to all; and that the exercise of natural rights has no other limit than their interference with the rights of others. Mirabeau endeavoured in vain to induce the Assembly to postpone publishing any declaration of rights until after the formation of the constitution; but the deputies, feeling that a contrary course might imperil their popularity, issued the declaration—a proceeding which Dumont himself afterwards compared to placing a powder-magazine under a building, which the first spark of fire would blow into the air. Louis XVI., under the pressure of the events of the 5th of October, after first refusing, was induced to yield his adhesion to it. The dogma of the equality of mankind on which the declaration rests, had before been set forth in the American Declaration of Independence of 1776. Thinkers are now much less inclined than they were in the age of Rousseau to build social theories on such abstract, *a priori* assumptions; and the truth of this doctrine of original equality is directly impugned. Dumont himself asks: 'Are all men equal? Where is the equality? Is it in virtue, talents, fortune, industry, situation? Are they free by nature? So far from it, they are born in a state of complete dependence on others, from which they are long of being emancipated.'

The principles laid down in the *Rights of Man* were attacked by Edmund Burke in his *Reflections on the French Revolution*, who represented the declaration as a digest of anarchy. It was in reply to Burke's *Reflections* that Thomas Paine published in London his *Rights of Man*, an apology for, and commentary on, the principles of the French constitution, for which he was prosecuted for libel on an information by the attorney-general, and found guilty.

RIGID DYNAMICS is that portion of theoretical Dynamics (q. v.) which, based on the theory of the free and constrained motion of *points*, applies the principles thence deduced to a *system* of points rigidly connected, so as to bear throughout the whole continuance of their motion the same invariable position with relation to each other; in other words, as no body in nature can be considered as a point, but is truly a system of points, rigid dynamics has for its aim to apply the abstract theory of dynamics to the cases actually occurring in nature. For a long time, problems of this sort were not resolved by any general and adequate method, but each class was worked out according to a method specially applicable to its particular circumstances. The great general principle discovered by the French geometer, commonly known as *D'Alembert's principle*, which applies equally to all such problems, and removes the necessity for specially investigating each particular case, was an inestimable boon to mechanical science. It is thus stated in his *Traité de Dynamique*: 'In whatever manner a number of bodies change their motions, if we suppose that the motion which each body would have in the following moment, if it were perfectly free, is decomposed into two others, one of which is the motion which it *really* takes in consequence of their mutual actions, then the other component will be such, that if each body were impressed by a force which would produce it alone, the whole system would be in equilibrium. In this way every dynamical problem can be compelled to furnish an equation of equilibrium, and so be changed into a problem of *Statics* (q. v.); and thus the solution of a difficult and complex problem is effected by means of the resolution of a much easier one. D'Alembert applied his principle to various problems on the motions and actions of fluids, the precession of the equinoxes, &c.; and subsequently, in a modified form, the same general property was made the basis of a complete system of dynamics, by La Grange, in his *Mécanique Analytique*.

RIGOR MORTIS is the term usually given to the peculiar temporary rigidity of the muscles that occurs shortly after death. It begins immediately after all indications of irritability (see MUSCLE) have ceased, but before the commencement of putrefaction. In the human subject it most commonly begins to shew itself about seven hours after death, although cases are occasionally met with in which 20, or even 30, hours may have elapsed before it begins to appear. This condition of rigidity usually lasts for about 30 hours; but it may pass off in ten hours or less, or may be prolonged to four or six days. The muscles of the neck and lower jaw are first affected, then those of the trunk, then those of the upper extremities, and lastly those of the lower extremities. In its departure, which is immediately followed by decomposition, the same order is followed.

This subject has been admirably discussed by Dr Brown-Sequard in the 'Croonian Lecture' for 1861, and contained in *The Proceedings of the Royal Society* for that year. In this lecture he examines successively the relations existing between muscular irritability, *post-mortem* rigidity, and putrefaction, in a variety of cases. The following are his chief conclusions: 1. Paralysed muscles are endowed with more irritability than healthy muscles; cadaveric rigidity sets in late, and lasts long; and putrefaction appears late, and progresses slowly. 2. Experiments made on numerous animals shew that when muscular irritability is increased by a diminution of temperature, the increase has the same effect upon rigidity and putrefaction as when it is caused by paralysis. As a general rule, when there was a difference of 14° to 18° F. in the temperature of two animals of the same age and species, irritability and rigidity lasted twice or three times longer in the cooler animal than in the other, and putrefaction in the former was much less rapid. 3. It was maintained by John Hunter that cadaveric rigidity does not take place after death by lightning; but it is now known that this view is not generally true. When lightning destroys life by producing such a violent convulsion of every muscle in the body that muscular irritability at once ceases, the ensuing rigidity may be of such short duration as to escape notice; but if it causes death by fright, hæmorrhage, or concussion of the brain, cadaveric rigidity will appear as usual. 4. In animals that have been over-driven, hunted to death, &c., rigidity comes on very quickly, lasts for a very short time, and is rapidly succeeded by putrefaction; and various facts quoted by Brown-

Sequard shew that over-exertion act similarly in man. 5. The nutrition of the muscles exerts a modifying influence on rigidity and putrefaction. In cases of death from decapitation, strangulation, sudden hæmorrhage from a wounded artery, &c., cadaveric rigidity does not begin till 16 or 18 hours after death, and lasts from six to eight days; while in a case of death from exhaustion, after a prolonged typhoid fever, rigidity became evident within three minutes after the last breathing, while the heart was still beating; disappeared in a quarter of an hour, and was at once succeeded by signs of putrefaction before the man had been dead an hour. 6. When death follows violent and prolonged convulsions (as in cases of tetanus, hydrophobia, &c.), cadaveric rigidity sets in soon (usually within an hour after death), and ceases before the end of the tenth hour; and when the convulsions were caused by strychnine, similar results were obtained.

From these facts this accomplished physiologist deduces the general law, that 'the greater the degree of muscular irritability at the time of death, the later the cadaveric rigidity sets in; and the longer it lasts, the later also putrefaction appears, and the slower it progresses.'

The exact cause of this rigidity is not accurately known. The old view that it depended on the coagulation of the blood is no longer tenable. It most probably results from the spontaneous coagulation of a fibrinous material contained in the muscular juice.

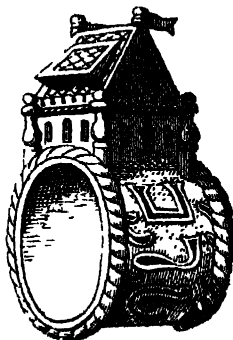
RI'GVEDA, the first and principal of the four Vedas. See VEDA.

RI'MA-SZO'MBATH, a market-town of Hungary, on the river Rima, 23 miles north-east of Pesth. Articles in wood are largely manufactured, and there is a trade in linen and bullock's hides. Pop. 8300.

RI'MINI (ancient *Ariminum*), a city of Central Italy, province of Forli, in Romagna. It is situated on the river Marecchia, and though the ancient harbour has been gradually filled up by the sands brought down by that stream, the port is still the resort of a large number of vessels engaged in fisheries, which employ nearly half the population of the town. Pop. 33,272. R. has fine streets, well-built houses, a handsome town-hall with porticoes, many fine churches, among others the cathedral built by Leon Battista Alberti, the interior of which is full of monuments; outside it is adorned with sarcophagi. It has a library, many superior schools, and two orphan asylums. Among its ancient monumental edifices still remaining, may be numbered the marble Bridge of Augustus over the Marecchia, and the marble Arch of Augustus. Its manufactures are glass and sail-cloth. R. was founded by the Umbri; it was conquered by the Romans, sacked by Sulla, plundered and destroyed several times by the Barbarians, then given by Charlemagne to the Church.

RINFORZA'NDO (Ital. strengthening), in Music, a direction to the performer indicating that the sound is to be given with increased tone and emphasis.

RING (Sax. *ring* or *hring*, a circle or circular line), a circle of gold or other material. The practice of wearing rings has been widely prevalent in different countries, and at different periods. Rings have been used to decorate the legs, arms, feet, toes, neck, fingers, nose, and ears. The practice of wearing rings suspended from the nose, which is bored for that purpose, has been found among various savage tribes, more particularly the South-Sea islanders. Bracelets, necklaces, and ear-rings have been worn among nations both savage and civilised; but the most universal and most famous use of rings is on the finger. Finger-rings are alluded to in the Books of Genesis and Exodus; Herodotus mentions that the Babylonians wore them; and from Asia they were probably introduced into Greece. The rings worn in early times were not purely ornamental, but had their use as signet-rings. The Homeric poems make no mention of rings, except ear-rings; but in the later Greek legends, the ancient heroes are described as wearing finger-rings; and every freeman throughout Greece seems afterwards to have had one. The practice of counterfeiting signet-rings is alluded to as existing in Solon's time. The devices on the earlier rings were probably cut in the gold; but at a later period, the Greeks came to have rings set with precious stones, which by and by passed from articles of use into the category of ornaments. Persons were no longer satisfied with one ring, but wore two or three and their use was extended to women. The Lacedæmonians wore iron rings. The Romans are said to have derived the use of rings from the Sabines; their rings were at first, as those of the Greeks, signet-rings, but made of iron. Every free Roman had a right to wear one; and down to the close of the republic, the iron ring was worn by those who affected the simplicity of old times. Ambassadors, in the early age of the republic, wore gold rings as a part of their official dress - a custom afterwards extended to senators, chief magistrates, and in later times to the equites, who were said to enjoy the *jus annuli aurei*, from which other persons were excluded. It became customary for the emperors to confer the *jus annuli aurei* on whom they pleased, and the privilege grew gradually more and more extensive, till Justinian embraced within it all citizens of the empire, whether *ingenui* or *libertini*. The signs engraved on rings were very various, including portraits of friends or ancestors, and subjects connected with mythology or religion; and in the art of engraving figures on gems, the ancients far surpassed artists of modern times. The later Romans, like the Greeks, crowded their fingers with rings, and the more effeminate among them sometimes had a different ring for summer and winter. Rings entered into the groundwork of many oriental superstitions, as in the legend of Solomon's ring, which, among its other marvels, sealed up the refractory Jins in jars and cast them into the Red Sea. The Greeks mention various rings endowed with magic power, as that of Gyges, which rendered him invisible when its stone was turned inwards; and the ring of Polycrates, which was flung into the sea to propitiate Nemesis, and found by its owner inside a fish; and there were persons who made a lucrative traffic of selling charmed rings, worn for the most part by the lower classes.


Fig. 1.

Various explanations have been given of the connection of the ring with marriage. It would rather appear that wedding-rings were worn by the Jews prior to Christian times. Fig. 1 shews a Jewish marriage ring beautifully wrought in gold filigree, and richly enamelled, now in the possession of Lord Londesborough. It has been said that as the delivery of the signet-ring to any one

was a sign of confidence, so the delivery of a ring by the husband to the wife indicated that she was admitted into his confidence. Another explanation is, that the form of the ring symbolises eternity and constancy; and it has been alleged that the left hand was chosen to denote the wife's subjection to her husband, and the third finger, because it thereby pressed a vein which was supposed to communicate directly with the heart. The third finger has always been selected as the finger on which official rings are to be worn. Bishops on their consecration receive a ring to be worn on the third finger of the right hand, in order to indicate ecclesiastical authority, and doctors were formerly in use, for a similar reason, to wear a ring on the same finger. A ring has been much used at betrothal as well as marriage, and in many parts of the continent of Europe a wedding-ring is worn by the husband as well as the wife. In Britain, rings are occasionally worn on all the fingers except the first finger and thumb; the Germans usually wear a signet-ring on the first finger. During the 16th, 17th, and 18th centuries it was a very common practice to have mottoes inscribed on rings (fig. 2), including wedding-rings, and the motto was called the *posy* or *chanson*. The ring was the symbol of the dominion of Venice over the Adriatic; and yearly, on Ascension Day, a ring was thrown by the doge from the ship *Bucentaur* into the sea, to denote that as the wife is subject to her husband, so is the Adriatic Sea to the republic of Venice.

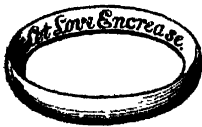


Fig. 2.

In pagan times in Europe, the ring seems to have been connected with fidelity or with espousals. Fig. 3 shews a form of betrothal ring called a *gimmal*, or linked ring, which was used in later times; the upper fig. shews the three parts brought together; the lower fig., the parts separately. By an ancient Norse custom, described in the *Eyrbrygia Saga*, when an oath was imposed, he by whom it was pledged passed his hand through a silver ring, sacred to that ceremony; and in Iceland the ceremony of betrothal used to be accompanied by the bridegroom passing his four fingers and thumb through a large ring, and in this manner receiving the hand of the bride, as represented in a woodcut in an old edition of *Olaus Magnus*. As lately as 1780, the practice existed in Orkney of a man and woman plighting their faith at the Standing Stones of Stennis by joining their hands through the perforated stone of Odin.

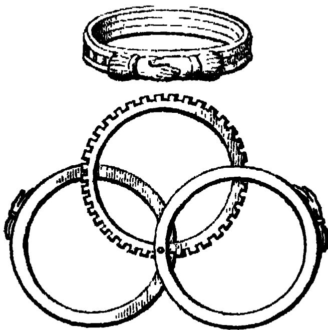


Fig. 3.

Rings were greatly used in ancient Egypt. They were called *tebh*, finger-rings, and *khatem*, signets, both kinds being represented in the sculptures and mentioned in the hieroglyphs. Besides these two classes, solid rings of gold and silver were used as money. Rings for the fingers are of the most remote antiquity, and were the emblems of rank and power. They were of two kinds; the solid ring, made of gold, silver, copper, or iron, having a square or oval bezel, on which the subject to be impressed was sunk or cut in intaglio. The oldest of these were of gold, iron not having been in use till the Roman rule over Egypt, or about the 1st c. A.D. A remarkably fine specimen is one of a Hemphite priest or flamen of the monarch Cheops, who lived in the time of the 26th dynasty, about the 5th c. B.C. But rings of this class are probably not so old as the other kind, which have a square or oblong plinth of gold, stone, or glass, on which the subjects are engraved also in intaglio. These plinths are pierced through their long axis to admit the metal ring, on which they revolve, and are secured to it by wire coiled round the ring at the place of insertion. Scarabæi of glazed steatite, set in frames of gold or silver, were often used for bezels. The bezels have their base engraved with hieroglyphs and other subjects, the names of monarchs, figures of deities, mottoes, and devices. Such rings were used by functionaries; and in the account of the investiture of Joseph in the Book of Genesis, a ring was put on his finger as a symbol of his rank. The poorer classes had rings of ivory or blue porcelain, with solid oval bezels, having in intaglio similar subjects. Rings appear to have been placed on all the fingers, and even the thumb, and the hands of ladies were loaded with these costly ornaments. A cat, emblem of the goddess Bast or Pasht, the Egyptian Diana, was a favourite subject of ladies' rings. The third finger of the left hand was the ring finger. Some remarkable instances of gold rings with revolving bezels have been found, as that of Thothmes III. in the collection of Lord Ashburnham, and another with the name of the monarch Horus, which contained gold to the value of £20. Such rings could give two impressions, like the seal and counterseal of modern times. The counterfeiting of signets was a crime, and the deceased, at the great judgment of the dead, protested he had not done so.—Wilkinson, *Mann. and Cust.*, vol. iii. pp. 370 and foll.; Bonomi, *Trans. R. Soc. Lit.*, New Series, vol. i. p. 108; Prisse, *Mon. Egypt.*, Pl. xlvii.

RINGBONES consist of a circle of bony matter round the horse's coronet, are most common in the fore limbs of draught horses with short upright pasterns, and much worked upon the hard roads; but they also occasionally appear on the hind limbs of lighter-bred horses. They seldom cause lameness, except when rapidly and recently formed; but as they are apt to stiffen the neighbouring joints, they constitute unsoundness. Rest should be enjoined, and cold bran poultices or swabs, kept cool and moist by any refrigerant mixture, applied continuously until heat and tenderness are removed, when the fetlock is to be fired or dressed with fly-blister, or the ointment of the red iodide of mercury.

RING DOVE. See PIGEON.

RING MONEY. At an early stage of society, prior to the invention of coinage, but after the inconveniences of direct barter had been discovered, the precious metals, formed into rings, were used as a medium of exchange; these same rings being also serviceable in some cases as personal ornaments. The use of ring money among the Egyptians is proved by representations of gold and silver money in their paintings, an instance of which is to be

seen in one of the grottoes in the Hill of Shek Abd at Quorneh, which bears the cartouche of Amunoph II. inscribed on its walls. The gold or silver rings were formed of a wire or bar of metal bent into a circle, but not quite united at the extremities, so that it could be easily made into a chain, from which portions could be detached at pleasure. It seems probable that the individual loops were not adjusted to a particular weight, but that each bundle of loops amounted in the aggregate to a particular weight. A metallic currency of this kind seems to be alluded to in the incident in the Book of Genesis, of the Hebrew patriarchs finding their money 'in full weight' at the mouth of their sacks. Ring money, both of gold and silver, similar to what is represented in the Egyptian paintings, was brought by Mr Bonomi from Nubia. Some of the silver rings had been worn as bracelets, and were ornamented with engraved work. This kind of currency has probably never gone out of use in some parts of Africa since the remote period when it was employed in paying the exactions of the Pharaohs. Ring money for African traders is regularly manufactured at Birmingham of copper, or an alloy of copper and iron, and known under the name of 'Manillas.'

The ring money of the East found its way at an early period to Western Europe, including the British Islands. In Sweden and Norway its use seems to have continued down to the 12th c., or even later. A Norse law made about the year 1220, alludes to an established ring money, of which each ring was of a definite weight. The medieval ring money had so far advanced beyond the Egyptian as to have each ring adjusted to a special weight, for which it might pass without weighing. Cæsar mentions gold and iron rings as used in Gaul and Britain for money; and gold and silver, and occasionally brass, ring money has been dug up in many parts of Britain, consisting of bars of metal bent in a circular shape; the ends in what seem to be the older specimens are left plain; in those of later times, they are flattened and ornamented. One example, found in one of the *Weems*, or subterranean dwellings of the island of Shapinshay in Orkney, is composed of three bars of gold twisted together like a cord. A remarkable silver chain of 33 rings, weighing above 93 ounces, was dug up in 1805 near Inverness, in the course of the excavations for the Caledonian Canal, and is now in the museum of the Scottish Antiquaries. Some of the larger specimens of gold ring money are very highly decorated. The gold torque worn round the neck of the Gallic warriors, weighing sometimes as much as four pounds, besides being a personal ornament, was adjusted to a certain weight as money.

Among the various modifications of ring money in use in different countries, may be mentioned the silver fish-hook money of Ceylon, mentioned by Tavernier, of the form of a flat wire bent into a hook, and issued as late as 1659. Specimens of it have lately been dug up.

RING OUZEL (*Turdus torquatus*, or *Merula torquata*), a species of thrush, rather larger than the blackbird, which it much resembles. It is a native of Europe, and chiefly of the western parts of it; spends the winter in the south of Europe or in Africa, and visits more northern regions in summer. It is of frequent occurrence in many parts of the British Islands. It is seldom seen in the more cultivated and thickly-peopled districts, but prefers mountain slopes, heaths, and their vicinity. It makes its nest generally in heathy banks, often under a bush. The nest is of coarse grass, within which is a thin shell of clay, and an inner lining of fine dry grass. The R. O. is a constant visitor of gardens in the neighbourhood of its haunts, committing great depredations, particularly when cherries are ripening. In Scotland it is known as the *Moor Blackbird*. It is of a dark-brown colour, almost black; the feathers edged with blackish-



Ring Ouzel (*Turdus torquatus*).

gray, the feathers of the wings more conspicuously edged with gray; a crescent-shaped white collar on the throat. The song consists of a few loud, clear, and plaintive notes.

RINGWORM is a popular term for several distinct forms of skin-disease which occur in patches of a circular or annular form on the body, and especially on the scalp. Thus, a species of Lichen (q. v.), known to dermatologists as *Lichen circumscriptus*, in which the papules assume a circular arrangement, is commonly regarded as ringworm; and the two species of Herpes (q. v.), known as *Herpes circinatus* and *H. Iris*, in which the vesicles occur in circular patches and in concentric rings, are usually included in the same term. None of these are, however, cases of true ringworm (*Tinea tondens*), which is a disease dependent on the presence of a special vegetable (fungous) parasite, now known to botanists as the *Trichophyton tonsurans*, or hair-plant, and discovered in 1845 by Malmsten.



Parasitic Fungus from the Root of the Hair in a case of True Ringworm, highly magnified.
(Copied from Aitken's *Science and Practice of Medicine*, 3d ed.)
A, isolated spores; B, spores united at their ends; C, C, empty tubes; D, sporular tubes.

It consists of oval, transparent spores or globules, about $\frac{1}{7000}$th of an inch in diameter, for the most part isolated, but sometimes connected by articulated filaments. This fungus is seated in the interior of the hair-roots, and the hairs and the fungi simultaneously increase in size. The diseased hairs lose their elasticity and break, when they have risen a

line or two above the scalp. In these cases the short stump of hair soon loses all its characteristics. If the hair breaks before emerging from the scalp, a little prominence is formed, consisting of fungus, epidermis, and sebaceous matter, and the assemblage of such little prominences gives the scalp the rough appearance known as goose-skin. This parasite exists, according to Dr Aitken—whose *Science and Practice of Medicine* contains an excellent abstract of all that is known regarding parasitic diseases—'in the *Herpes tonsurans* of Cazenave, which is the *Porrigo scutulata* of Willan, the *Tinea tonsurans* of Bazin, and the *Trichosis furfurans* of Erasmus Wilson and Dr Wood.' There are three varieties of true ringworm, which are described by Aitken under the following names: (1.) Ringworm of the Body (*Tinea circinatus*); (2.) Ringworm of the Scalp (*Tinea tonsurans*); and (3.) Ringworm of the Beard (*Tinea sycosis*).

1. *Ringworm of the Body* first appears as a rose-coloured and slightly-elevated spot about the size of a fourpenny-piece, on which a bran-like desquamation of epidermis soon begins, accompanied by slight itching. This spot gradually increases in size, but retains its circular form; and as it extends, the healing process commences at the centre, so that the circular red patch is converted into a ring, enclosing a portion of healthy skin; and a ring thus formed may continue to increase till it reaches a diameter of four inches, or even more. It is apt to affect the face, the neck, the back, and the outside of the wrist. This form of ringworm frequently terminates spontaneously.

2. *Ringworm of the Scalp* usually occurs in children, and is especially prevalent when the nutrition is defective, or there is a scrofulous taint in the constitution. It appears in the form of round, scaly, irritable patches on different parts of the head; and the irritation often occasions the formation of minute vesicles. The hairs at these spots become dry and twisted, and are easily extracted; and when the disease advances, they break close to the scalp if an attempt is made to extract them. The stumps, and the epidermis surrounding them, become covered with a characteristic grayish-white powder, consisting of the sporules of the fungus. The diseased parts are slightly elevated and puffy, and differ from the healthy scalp in colour, being bluish or slate-coloured in dark persons, and grayish-red or yellow in fair patients. The inflammation will last as long as the growth of the fungi continues; and even when they die spontaneously, as sometimes occurs, the affected spots remain permanently bald, in consequence of the hair-bulbs having become obliterated.

3. *Ringworm of the Beard* is chiefly met with on the chin, hairy part of the cheeks, and upper lips of men; but it occasionally attacks the axillæ and pubic region of women. It commences like ringworm of the body, but when the deeper structures become affected, pustular indurations, resembling Acne (q. v.), occur, and the hairs become readily detached. On examining the hairs under the microscope, it is seen that they are thickened; that their bulbs are partially disorganised; and that the medullary portion is atrophied.

The essential point in the treatment of all the varieties of true ringworm, is to apply to the roots of the hairs a preparation which will destroy the fungus; but before this can be done, the hair must be removed, if the disease has not already effected the removal sufficiently. This is best effected with small pincers about three inches long, and constructed so that the two extremities, which should be a couple of lines broad, shall come together very exactly. Or, in place of using the forceps, an ointment, composed of lime and carbonate of soda, of each 1 part, and 30 parts of lard, may be applied, which will soon remove the hair. French dermatologists recommend the application of 'l'Huile de Cade,' or 'oil of pitch,' obtained by the dry distillation of the wood of the *Juniperus oxycedrus*, to the part from which the hairs are to be removed, believing that it lessens the sensibility, and tends to loosen the attachment of the hair. In order to destroy and remove the plant, lint dipped in a solution of sulphurous acid should be continuously applied—sulphurous acid being probably the most energetic parasiticide at present known. Amongst the solutions that have been applied with the same object, may be mentioned that of corrosive sublimate, 1 part to 250 of water. The general health must be at the same time attended to, and the internal use of cod-liver oil may usually be advantageously combined with the local applications.

Ringworm in the lower animals, as in the human subject, consists of the growth of a vegetable fungus on the surface of the skin, is common amongst young animals, is decidedly contagious, and communicable from man to the lower animals, and probably, also, from the lower animals to man. Commencing with a small itchy spot, usually about the head or neck, or root of the tail, it soon spreads, producing numbers of scurfy circular bald patches. It is unaccompanied by fever, and seldom interferes seriously with health. After washing with soap and water, run over the spots lightly every day with a pencil of nitrate of silver, or rub in a little of the red ointment of mercury, or some iodide of sulphur liniment.

RINNS OF GALLOWAY. See WIGTONSHIRE.

RI'O BRA'NCO, a river of Brazil, the largest affluent of the Rio Negro, rises near the sources of the Orinoco, in lat. about 3° N., long. about 64° W. It flows first east to long. 61° W., and then south-south-west to the Rio Negro, which it joins after a course estimated at 700 miles in length. At its junction with the Negro it is upwards of a mile in breadth, and its lower course resembles a string of lakes connected by narrow canals. Its navigation is much impeded by rapids and waterfalls.

RIO BRAVO DEL NORTE, or RIO GRANDE. See BRAVO DEL NORTE.

RI'O DE JANEI'RO, a maritime province in the south-east of Brazil, bounded on the south and east by the Atlantic. Area 18,060 sq. m.; pop. 1,200,000. The coast on the north-east is low, lined with lagoons and marshy tracts; but in the south the scenery of the shores is unusually beautiful. Mountain-ranges occupy the middle of the province, among which the peaks of the Organ Mountains, rising to from 6000 to 7000 feet, are conspicuous. Of the rivers the Parahiba is the chief. The soil is fertile, and the principal productions are sugar, coffee, cocoa, cotton, rice, and maize. The province is traversed by a railway. The capital is Praia Grande or Netherohy, which, including the district of St Domingo, contains about 16,000 inhabitants. The largest and most important town, however, is Rio de Janeiro (q. v.).

RIO DE JANEIRO, generally called RIO, the capital of the Brazilian empire, and the largest and most important commercial emporium of South America, stands on a magnificent harbour, 75 miles west of Cape Frio, in lat. 22° 54′ S., long. 43° 15′ W. The harbour or bay of R., said, and apparently with justice, to be the most beautiful, secure, and spacious bay in the world, is landlocked, being entered from the south by a passage about a mile in width. It extends inland 17 miles, and has an extreme breadth of about 12 miles. Of its numerous islands, the

largest, Governor's Island, is six miles long. The entrance of the bay, guarded on either side by granite mountains, is deep, and is so safe, that the harbour is made without the aid of pilots. On the left of the entrance rises the peak called, from its peculiar shape, Sugar-loaf Mountain; and all round the bay, the blue waters are girdled with mountains and lofty hills of every variety of picturesque and fantastic outline. The harbour is protected by a number of fortresses. The city stands on the west shore of the bay, about 4 miles from its mouth. Seven green and mound-like hills diversify its site; and the white-walled and vermilion-roofed houses cluster in the intervening valleys, and climb the eminences in long lines. From the central portion of the city, lines of houses extend four miles in three principal directions. The old town, nearest the bay, is laid out in squares; the streets cross at right angles, are narrow, and are paved and flagged; and the houses, generally built of granite, are commonly two stories high. West of it is the elegantly built new town; and the two districts are separated by the Campo de Santa Anna, an immense square or park, on different parts of which stand an extensive garrison, the town-hall, the national museum, the palace of the senate, the foreign office, a large opera-house, &c. From a number of springs which arise on and around Mount Corcovado (3000 feet high, and situated 3½ miles south-south-west of the city), water is conveyed to R. by a splendid aqueduct, and supplies the fountains with which the numerous squares are furnished. Great municipal improvements have within recent years been introduced; most of the streets are now as well paved as those of the finest European capitals; the city is abundantly lighted with gas; and commodious wharfs and quays are built along the water-edge. R. contains several excellent hospitals and infirmaries, asylums for foundlings and female orphans, and other charitable institutions, some richly endowed; about fifty chapels and churches, generally costly and imposing structures, with rich internal decorations; and several convents and nunneries. In the College of Pedro II., founded in 1837, the various branches of a liberal education are efficiently taught by a staff of eight or nine professors; the Imperial Academy of Medicine, with a full corps of professors, is attended by upwards of 300 students; there is also a theological seminary. The national library contains 80,000 vols. The trade and commerce of R. is great, and is annually increasing, although within recent years it has been temporarily retarded by the American war. In the year 1862—1863, the exports—of which the principal articles were coffee (nine-tenths of the whole), hides, sugar, rice, cotton, rosewood, rum, tobacco, horns, ipecacuanha, and tapioca—amounted to £5,900,000, and were sent chiefly to England and France; and the imports—of which the chief were silk, linen, woollen, and cotton goods, iron and rigging for ships—amounted to £5,582,431. More than a half of all the imports came from Great Britain. During the year 1863, 5980 vessels of 1,069,396 tons, exclusive of mail-steamers from Southampton and Bordeaux, entered and cleared the port. The trade of R. will increase enormously when the railways leading to the city, already commenced, have been completed. Pop. about 300,000.

The vicinity of R. was first settled by the French in 1555, but was occupied in 1567 by the Portuguese, who founded the present city, and gave to it the name of St Sebastian. For the space of 140 years after its foundation, the city enjoyed a state of tranquil prosperity, and in 1763 it superseded Bahia as the seat of government, and became the residence of the viceroys of Portugal. On the proclamation of independence in 1822 (see BRAZIL), R. became the capital of the Brazilian empire.

RIO GRANDE, a name sometimes applied to the upper course of the river Parana (q. v.) in Brazil.

RIO GRANDE, a river of Senegambia (q. v.).

RIO GRANDE, or **RIO GRANDE DEL NORTE**. See BRAVO DEL NORTE.

RIO GRANDE DO NORTÉ, a small maritime province of Brazil, occupies the north-east angle of the country, and is bounded on the N. and E. by the Atlantic. Area 16,842 sq. m.; pop. (1856) 190,000. It derives its name from a river, formerly called the Rio Grande, and now called the Potengi, which flows into the Atlantic at Natal; but the principal river is the Piranhas. The surface is flat along the shores, which are skirted by many dangerous shoals, but is hilly and mountainous in the interior. Salt is obtained in large quantity from a number of salt lakes, and building-stone is abundant. The soil, generally sterile, is fertile on the river-banks. The principal crop raised is cotton, and large herds of horses and cattle are reared on the pastures, which are extensive. The capital is Natal (q. v.).

RIO GRANDE DO SUL, or, to give the name in full, SAO PEDRO DO RIO GRANDE DO SUL, a maritime province of Brazil, constituting the extreme south portion of the empire of that name. It is bounded on the N. and W. by the river Uruguay, on the S.-W. by the republic of Uruguay, and on the S.-E. by the Atlantic. Area, 85,239 sq. m.; pop. (1863) 400,000, of whom 75,000 were slaves. The central districts are occupied by a range of mountains, which runs almost parallel to the Uruguay, and from which the land falls away into plains towards the Uruguay on the west, and the Atlantic on the east. Between the mountains and the flat coast regions are the large lakes Merim and Des Patos—the latter, 175 miles long and about 40 miles broad. Its salubrity of climate and fertility of soil admirably adapt it for European immigration. The great wealth of the province is in its flocks and herds, which are reared in great numbers on the *campinas* or prairies. It is stated that 500,000 cattle, whose hides and flesh are preserved, are slaughtered here annually, while as many more are driven northward for ordinary consumption. All the cereals and fruits of Central Europe can be grown here advantageously, and the inhabitants are awakening to the importance of developing the immense agricultural resources of the province. A considerable area is now covered with crops of maize, beans, wheat, and potatoes, and the agricultural products, which, till recently, were of little account, now form one-eighth of the whole exports. The gold-mines of the province yielded, in 1863, 6100 ounces, the value of which is stated at £25,000. The principal articles of export of the province are beans, horns, hair, cattle and horse hides, grease and tallow, jerked or dried beef, tongues, mandioc flour, and maize. Of the most of these articles, the quantity exported has increased so rapidly as to be in 1861 about double what it was in 1856. In 1861, the exports amounted to £1,637,846. The half of all the imports of the province consists of cotton, woollen, and linen manufactures, coals, earthenware, and hardware from Great Britain. The principal towns are Porto Alegre (q. v.) and Rio Grande do Sul. The latter, a small but prosperous and increasing seaport at the south extremity of the Lake des Patos, and close to the sea, imported in 1861 goods to the amount of £582,573, while its exports in the same year amounted to £509,843 exclusive of the produce shipped from the port of

Sao Jose do Norte (value £224,099), which may be considered a port of itself. In 1861, 1148 vessels of 250,939 tons, including the vessels engaged in the coasting-trade, entered and cleared the port.

RIOM, a small town of France, in the dep. of Puy-de-Dôme, is picturesquely situated on a hill, 1173 feet above the sea, 8 miles north-north-east of Clermont. It is built of dark lava, and is a perfect treasure of domestic architecture, especially of the Renaissance period. Linen, leather, and brandy are manufactured. Pop. (1862) 8206.

RI'O NE'GRO, one of the principal affluents of the Amazon, rises in an unexplored district of the south of the United States of Colombia (New Granada), flows in a general south-south-east direction, and joins the Amazon at Manaos, after a course estimated at 1000 miles in length. It receives from the north the Cassiquiare (q. v.), by means of which communication is established between the Orinoco and the Amazon; also the Cababuri, Padaviry, Branco, and other large streams; from the south comes its greatest affluent, the Vaupes. It is 1½ miles broad when it enters the Amazon.

RIO NEGRO, a river of South America, forms the greater part of the boundary between the Argentine Republic and Patagonia. At its source, it is called by the natives Melly-roumey-co—i. e., *four small rivers*—from the fact that it is formed by four head-waters from the bosom of the Cordilleras. It is afterwards called by the natives Couroumey-co, or Black River (Span. Rio Negro), from the dark colour of its waters, caused by the depth and narrowness of its channel. It flows first north-east, then east and south-east through the plains to the Atlantic, into which it falls in lat. 41° 3′ S., after a course of upwards of 700 miles. Shoals and islands obstruct its channel, and it is navigable only for 20 miles above its mouth.

RIONE'RO, a large town of Southern Italy, in the province of Basilicata, 7 miles south of Melfi, pop. 13,804. It produces grain, maize, pulse, and wine. The inhabitants are agriculturists and shepherds. There is a great trade carried on in maple snuff-boxes, which are manufactured here.

RIOSE'CO, Medina de, a small town of Spain, in the province of Valladolid, and 26 miles north-west of the city of that name, stands on two hills in a fertile district. In the middle ages, it was the centre of considerable trade, but it has much declined in recent times. The chief church is that of Santa Maria, a beautiful Gothic edifice, richly decorated, and containing several excellent pictures. Here, in 1808, a Spanish army, 50,000 strong, under Blake and Cuesta, was defeated, with a loss of 6000 men, by 12,000 French troops, under Bessières. The chief result of this battle was that Joseph Bonaparte was placed on the throne of Madrid. After the defeat, the unresisting town was sacked with more than wonted barbarity. Pop. about 4500.

RIOT is the legal name of an offence which consists in the assembling of three or more persons for an illegal purpose, or for the carrying out of a legal purpose in an illegal manner. Riots often commence in some supposed private wrong. Some degree of violence is incidental to a riot, and a degree of intimidation to the neighbourhood. A riot cannot take place unless at least three persons act in concert. When a riot becomes formidable, it is usual for the authorities to take active measures to disperse it. Thus, any justice of the peace may command the persons assembled to disperse peaceably by a form of words called reading the Riot Act, which is as follows: 'Our Sovereign Lady the Queen chargeth and commandeth all persons being assembled immediately to disperse themselves, and peaceably to depart to their habitations, or to their lawful business, upon the pains contained in an Act of King George for preventing tumults and riotous assemblies.—God save the Queen.' If the rioters, after this formal proclamation, remain more than one hour afterwards, they are guilty of felony, and may be seized, and carried before a justice. Sometimes it is difficult to distinguish between an illegal assembly and one which is legal, though noisy and tumultuous, and the opinion of the justice of the peace is not conclusive as to its illegality. Sometimes the Riot Act is read more than once during the disturbance, in which case the second or third reading does not supersede the first.

RIOUW', a Netherlands residency or government in the Eastern Archipelago, including the Riouw, Lingga, Tambilan, Anambas, and Natuna island groups, lying between Malacca, Sumatra, Banca, and Borneo. Area, 3120 sq. miles. Pop. (1858) of the whole group about 75,000. The resident of R. also rules over the small kingdoms of Kampar, Siak, and Indragiri, on the east coast of Sumatra (q. v.), with a population of over 20,000.

The islands of the Riouw-Lingga Archipelago are mountainous, the peak of Lingga rising to a height of 3712 feet. Many of them are covered with heavy timber and a dense underwood, through which it is difficult to force a way. As far as is known, the prevailing rocks are granitic and sandstone. Gold is found in Lingga, and tin was formerly extensively wrought; but the richer mines of Sinkep and the Carimon islands, in the southern entrance of the Strait of Malacca, now yield the largest amount of that ore. Coal is also found in the Riouw-Lingga islands.

The climate is not considered unhealthy, though at times the heat is intolerable. The chief products are sago, pepper, damar resin, gambir, gutta-percha, ratans, cotton, fruits, and many varieties of fine timber. Edible nests are found in abundance, and the waters swarm with fish. Agar-agar, tripang, or bêche-de-mer, and shell-fish, are largely collected. The *Uncaria gambir* is extensively cultivated, from the leaves of which upwards of 100,000 piculs (each 133 lbs.) of gambir are yearly manufactured—700 factories, with 6000 Chinese, being employed in that industry.

The industries are manufacturing gambir, distilling arrack, weaving silks, ship-building, wood-cutting, tile and brick making, together with extensive fisheries. The original inhabitants are Malays, who are more numerous in Lingga than the other islands. The strangers are Europeans, in the pay of the Netherlands colonial government, Chinese, Buginese, and Javans. The town of Riouw is at the north-west end of the island, in a beautiful bay where there is safe anchorage.—See *Journal of the Ind. Archip.* vol. i.; Crawford's *Descriptive Dict.*; *De Residentie Riouw*, door J. J. de Hollander (Breda, 1861); and *Nederlandsch Indie* (Amsterdam, 1863).

RI'PON, a market-town, and municipal and parliamentary borough, in the West Riding of Yorkshire, 23 miles north-west of York. The market-place, to which the four principal streets lead, is spacious, surrounded by good houses and shops, and has in its centre an obelisk 90 feet high. R. is a bishop's see. The cathedral, founded 1109—1114 is cruciform, is surmounted with two uniform towers, 110 feet high at the west end, and also by a centre tower. It is esteemed one of the best proportioned churches in the kingdom. Trinity Church, built in 1826, is a fine cruciform edifice in Early English. There are other places of worship, two hospitals, and a number of important schools,

one of which, the grammar-school, has an endowment of £600 a year. The principal branches of industry are machine-making, tanning, malting, and brass and iron founding. There are also several flour-mills and varnish-factories. Pop. (1861) 6172.

RIPPLE-MARK. Undulations similar to those observed on sandy shores, and produced by the particles of sand being drifted along by the water, have been observed on the surface of sandstones of all ages. They may be held generally as indicating that the deposition of the bed on which they occur took place on a sea-beach, or under water not more than ten feet deep. Recent ripple-marks have, however, been observed at a depth of 60 feet, and there is reason to believe that mud and sand may be disturbed at much greater depths by currents of water. Loose sand also may be driven by the wind into ripple-waves, that cannot be distinguished from those produced by the receding tide.

R'ISHI (from the obsolete Sanscrit *r'ish*, see, kindred with *dr's'-*, δερκ-) is the title given to the inspired poets of the Vedic hymns, as they were supposed to have 'seen,' or, in other words, received, the Vedic hymns from the deity through the sense of sight. 'The R'ishis,' Yâska (q. v.) says, 'saw the hymns with all kinds of intentions.' They were therefore the oldest poets of India, and the word R'ishi itself becomes thus even identified with Vedic poetry. At a later period, however, the title R'ishi was given to renowned authors, though they were not considered as inspired by a deity, as, for instance, to the authors of the Vedic Kalpa, works which, by all Hindu writers, are admitted to be of human authorship.—Compare Goldstücker, *Pân'ini*, &c., p. 64, ff.

RISING, in Heraldry, a term applied to a bird when represented opening his wings as if about to take flight.

RISING IN THE AIR. The name of a belief (prevalent in the middle ages) that the bodies of holy persons were sometimes lifted up and suspended in the air during the continuance of a religious ecstasy. Calmet states in his work on Apparitions that this singular phenomenon might be produced by the fervour of the Holy Spirit; by the ministry of good angels; or by a miraculous favour of God, who desired thus to do honour to his servants in the eyes of men. Numerous instances are recorded in the *Acta Sanctorum*. St Philip of Neri, in his religious ecstasies, was elevated in the air, sometimes to the height of several yards, almost to the ceiling of his room, and this quite involuntarily. He tried in vain to hide it from the knowledge of those present, for fear of attracting their admiration. St Ignatius de Loyola was sometimes raised up from the ground to the height of two feet, while his body shone like light. St Robert de Palentin rose also from the ground sometimes to the height of a foot and a half, to the great astonishment of his disciples and assistants. In the life of St Dunstan it is stated that, a little time before his death, as he was going up stairs to his apartment, accompanied by several persons, he was observed to rise from the ground; and as all present were astonished at the circumstance, he took occasion to speak of his approaching death. In a recent biography of Girolamo Savonarola, it is also stated that while that martyr was in prison, shortly before his execution, he was observed once, while in prayer, raised from the ground, and was seen distinctly suspended in the air for some short period.

These relations account for the frequency with which representations of saints are exhibited in an aërial position in medieval paintings and works of art. This belief falls in with one of the alleged phenomena of modern Spiritualism (q. v.).

RISK, in point of law, is used chiefly in reference to the sale of goods, and injury or loss to the goods before delivery. On such occasions, the question, in English law, is governed by the previous question, whether the property has passed or not by the sale. If it has, then whoever is the owner must bear the loss of the goods. In Scotland, the risk is with the buyer of goods, whether the right of property has passed or not. See CARRIER.

***RISO'TTO**, an elegant Italian dish, consisting chiefly of rice. Onions are shredded into a frying-pan with plenty of butter, and they are fried together until the onions become very brown, and communicate their colour to the butter. The butter is then run off, and to this is added some rich broth, slightly coloured with saffron, and the whole is thickened with well-boiled rice, and served up as a pottage, instead of soup, at the commencement of a dinner.

RISSOLE, a culinary preparation used as an *entrée*. It consists of meat or fish of any kind finely minced and made into small forms, which are then coated with a very thin crust either of pastry or of bread-crumbs mixed with yolk of egg, and fried. There is great variety in this dish.

RITE (Lat. *ritus*) is in general an external sign or action employed in religious use, and designed either to express or to excite a corresponding internal religious feeling. Such are, for instance, the uplifting or outstretching the hands in prayer, the imposition of hands in blessing, &c. The ancient Jewish religion abounded with rites and ceremonies, and through their excessive multiplication in the religions of the Gentiles, religion degenerated almost entirely into outward form. A marked distinction in this respect is drawn by our Lord (John iv. 23) between the old and the new law, which one class of Christians have interpreted as a condemnation of all external ceremonial, while even those who contend for the retention of ceremonies in Christian worship require that their use should always be accompanied and elevated by the corresponding internal spirit. The great ground of difference in the Puritan controversy in England and the corresponding disputes in continental churches, was the lawfulness of ceremonies. See GENUFLEXION, PURITAN.

The name rite is sometimes used to signify the aggregate of all the ceremonies used in a particular religious office, as the 'rite' of baptism or of the Eucharist. In a still wider sense, it is used of the whole body of distinctive ceremonial, including the liturgy employed by a particular community of Christians. In this way we speak of the 'Roman rite,' the 'Greek rite,' the 'Syrian rite,' the 'Armenian rite,' the 'Coptic' or the 'Slavonic rite.'

RITENU'TO (Ital. kept back), a term in Music implying that the speed of the movement is to be diminished.

RITORNE'LLO (Ital. return), in Music, in its original sense, a short repetition like that of an echo, or a repetition of the closing part of a song by one or more instruments. The same term has, by later usage, been applied to all symphonies played before the voices begin which prelude or introduce a song, as well as the symphonies between the members or periods of a song.

RITSCHL, FRIEDR. WILH., one of the first (perhaps the very first) classical philologists of modern times, was born at Grossvargula in Thuringia, 6th April 1806. He studied at Leipzig under Hermann, and from 1826 to 1829 at Halle, where he eagerly

availed himself of the lectures and society of Reissig. In 1832, he was called to Breslau as extraordinary professor, receiving at the same time a joint-directorship of the philological seminary there. Two years afterwards, he became ordinary professor, and spent the winter and spring of 1836—1837 on a learned tour through Italy. In 1839, he accepted an invitation to Bonn as professor of classical literature and rhetoric, where his profound yet vivid and spirited style of lecturing soon drew (and continues to draw) unusually large audiences. The Prussian government conferred on him the rank of privy councillor in 1856. His first literary works were devoted to the Greek grammarians, as the edition of Thomas Magister (Halle, 1832), the acute and penetrating treatise, *De Oro et Orione* (Bresl. 1834), and the richly elucidatory *Die Alexandrin. Bibliotheken und die Sammlung der Homerischen Gedichte durch Pisistratus* (Bresl. 1838), sufficiently prove; but by far his greatest work is his edition of Plautus (Bonn, 1848—1853), executed with the richest critical apparatus, and exhibiting, in regard to the emendation and exposition of the text, a faculty of genial intuition worthy of Bentley. It was accompanied by a comprehensive *prolegomena* on the Plautinian metres. The work secured for him a splendid reputation among his countrymen, who consider it to have really opened up the way for the first time to a critical study of the old Roman poetry. Among the numerous productions of R. which may be regarded as preparatory to this *chef-d'œuvre*, the most important is his *Parerga Plautina et Terentiana* (Leip. 1845). More recently, his literary activity has taken another direction—viz., a systematic treatment of Latin inscriptions, with the view of illustrating the history of the Latin language. His labours in this department have been crowned with success, for R. has thrown more light upon the successive phases of the language than any other single individual. To this field belong his *Lex Rubria* (Bonn, 1851), *Titulus Mummianus* (Berl. 1852), *Monumenta Epigraphica Tria* (Berl. 1852), *Inscriptio Columnæ Rostratæ* (Berl. 1852), *Anthologiæ Latinæ Corollarium* (Berl. 1853), *De Sepulcro Furiorum* (Berl. 1853), *De Fictilibus Litteratis, &c.* (Berl. 1853), *Poesis Saturninæ Spicelegium* (Bonn, 1854), *De Titulo Metrico Lambacsensi* (1855), *De Varronis Hebdomadum Libris* (1856), *In Leges Visellian, Antoniam, Corneliam Observationes Epigraphicæ* (1860), and *Proœmiorum Bonnensium Decas* (1862). Besides these works, R. has contributed a large number of learned dissertations to the programmes of the university of Bonn, in the *Transactions* of the Archæological Institute of Rome, and in the *Rheinisches Museum für Philologie*.

RITTER, Heinrich, German philosopher, was born at Zerbst in 1791, studied theology at Halle, Göttingen, and Berlin, from 1811 to 1815, and in 1824 was created Professor Extraordinarius at Berlin University. In 1835, he accepted a call to the university at Kiel, and went thence in 1837 to Göttingen. R. owes his literary fame especially to his profound works on the history of philosophy. The principal are: *Ueber die Bildung des Philosophen durch die Geschichte der Philosophie* (On the Education of the Philosopher through the History of Philosophy), 1817; *Welchen Einfluss hat die Philosophie des Cartesius auf die Ausbildung der des Spinoza gehabt?* (What Influence has the Philosophy of Descartes exercised on that of Spinoza?) Leip. and Altenb. 1817; *Ueber die Philos. Lehre des Empedokles* (On the Philosophical Doctrine of Empedocles), 1820, in Wolf's *Literary Analecta*; *Geschichte der Ionisch. Phil.* (History of the Ionian Philosophy), Berl. 1821; *Geschichte der Pythagorisch. Phil.* (History of the Pythagorean Philosophy), Hamb. 1826; *Bemerkungen üb. die Phil. d. Megarisch. Schule* (Remarks on the Philosophy of the Megaric School), Rheinisches Museum, 2d series; *Gesch. der Phil.* (History of Philosophy), vol. i.—xii. Hamb. 1829—1853; 2d ed., vol. i.—iv., 1836—1838; *Vorlesungen zur Einleitung in die Logik* (Introductory Lectures to Logic), Berl. 1823; *Abriss der Philosophisch. Logik*, Berl. 1824; *Die Halb-Kantianer und der Pantheismus* (The Half-Kantians and Pantheism), Berl. 1827; *Ueber das Verhältniss der Philosophie zum wissenschaftlichen Leben ueberhaupt* (On the Relation between Philosophy and Scientific Life in General), Berl. 1835; *Ueber die Erkenntniss Gottes in der Welt* (The Recognition of God in the World), Hamb. 1836; *Uber das Böse* (On Evil), Kiel, 1839; Philosophical Essays (Kiel, 1839—1840). R. is not a partisan of any philosophical school, but a critic of all. His writings, which are conspicuous for the learning and acuteness they display, are naturally held in high estimation by the French Eclectics, and several of his works have been translated into the French language.

RITTER, Karl, an illustrious geographer, was born August 7, 1779, in Quedlinburg, in Prussia, studied in Halle, was nominated in 1820 Professor Extraordinarius of Geography at Berlin University, became subsequently member of the Academy, and Director of Studies of the Military School. He died 28th September 1859. With R., as the founder of general comparative geography, begins a new epoch in the history of geographical science. His chief works are: *Die Erdkunde im Verhältnisse zur Natur und Geschichte des Menschen* (Geography in its Relation to Nature and the History of Men), 17 vols. Berl. 1822—1854. The work is divided into 4 parts, 1. Introduction and East Asia, in 5 vols., containing Middle Asia, High Asia, Siberia, China, and India, vol. ii.—vi.; 2. West Asia, in 5 vols. (vols. vii.—xi.); 3. Arabia (vol. xii.—xiii.); 4. The Sinai Peninsula, Palestine, Syria (vol. xiv.—xvii.), with four indexes, and an Atlas of Asia. Introduction to an Essay on a more Scientific Treatment of Geography (Berl. 1852); *Europa, ein geographisch., historisch., statistiches Gemälde* (Europe, a Geographical, Historical, Statistical Picture), 2 vols. Frankf. 1807; *Die Stupas, oder die architect. Monumente, &c.* (The Stupas, or the Architectural Monuments on the Indo-Bactrian Royal Road, and the Colossus of Bamyan), Berl. 1838). Many of his antiquarian and historico-antiquarian researches are contained in the *Monatsberichten* of the Berlin Geographical Society, and in the *Zeitschrift für allgemeine Erdkunde, &c.* Other noteworthy productions are: *Die Colonisirung von Neu Zealand* (Berl. 1842); *Blick auf das Nilquellland* (Berl. 1844); *Der Jordan und die Beschiffung des Todten Meeres* (Berl. 1850); *Ein Blick auf Palæstina und die Christliche Bevölkerung* (Berl. 1852).

RI'TUAL (Lat. *rituale*, a book [or collection] of rites), the name of one of the service-books of the Roman Church, in which are contained the prayers and order of ceremonial employed in the administration of certain of the sacraments and other offices of the church. The ceremonial of the offices of the Roman Church administered by bishops is contained in the books entitled *Pontificale* and *Ceremoniale Episcoporum*. The priestly offices are detailed in the Ritual. In its present form, it dates from the Council of Trent, which directed a revision of all the different rituals then in existence, which were numerous, and exhibited considerable variety of detail. Paul V., in 1614, published an authoritative edition, which has frequently been reprinted, and of which a further revision was issued by Benedict XIV. Besides the Roman Ritual, there are many diocesan rituals, some

of which are of much historical interest. In the Greek Church, as in the other eastern communions, the Ritual forms part of the general collection (which contains also the Eucharistic service) entitled *Euchologion*. In the Anglican Church, also, the *Book of Common Prayer* may be said to contain the Ritual. The most approved commentary on the Roman Ritual is that of Barrufaldo (2 vols., Florence, 1847).

RIVE-DE-GIER, a flourishing manufacturing town of France, in the dep. of Loire, stands on the Gier, in the middle of the best coal-field in France, 13 miles north-east of St Etienne by railway. There is water-communication with the Rhone by means of the Canal-de-Givors, which extends from this town to Givors, on the Rhone. South of the town is the immense and well-built basin of Couson, containing 1,500,000 cubic *mètres* of water for the supply of the canal. R. was formerly a mere stronghold, surrounded by high walls, and defended by a strong castle; and in 1815, the number of its inhabitants was under 4000. In 1862, it contained 13,752 inhabitants. Around the town, there are about 50 coal-mines in operation; and the principal manufacturing establishments are silk-mills, large and important glass-works, factories for steam-engines and other machinery, steel factories and foundries.

RIVER. Rivers are the result of the natural tendency of water, as of all other bodies, to obey the law of gravitation by moving downwards to the lowest position it can reach. The supply of water for the formation of rivers, though apparently derived from various sources, as from rain-clouds, springs, lakes, or from the melting of snow, is really due only to atmospheric precipitation; for Springs (q. v.) are merely collections of rain-water; lakes are collections of rain or spring water in natural hollows, and snow is merely rain in a state of congelation. The rills issuing from springs and from surface-drainage unite during their downward course with other streams, forming *rivulets;* these, after a further course, unite to form *rivers*, which, receiving fresh accessions in their course from *tributaries* (subordinate rivers or rivulets) and their *feeders* (the tributaries of tributaries), sweep onwards through ravines, and over precipices, or crawl with almost imperceptible motion across wide, flat plains, till they reach their lowest level in ocean, sea, or lake. The path of a river is called its *course;* the hollow channel along which it flows, its *bed;* and the tract of country from which it and its subordinates draw their supplies of water, its *basin*, or *drainage-area*. The basin of a river is bounded by an elevated ridge, part of which is generally mountainous, the crest forming the water-shed; and the size of the basin, and the altitude of its water-shed, determine, *cæteris paribus*, the volume of the river. See RAIN. The greater or less degree of uniformity in the volume of a river in the course of a year, is one of its chief physical features, and depends very much on the mode in which its supply of water is obtained. In temperate regions, where the mountains do not reach the limit of perpetual snow, the rivers depend for their increase wholly on the rains, which, occurring frequently, and at no fixed periods, and discharging only comparatively small quantities of water at a time, preserve a moderate degree of uniformity in the volume of the rivers—a uniformity which is aided by the circumstance, that in these zones, only about one-third of the rainfall finds its way directly over the surface to the rivers; the remaining two-thirds sinking into the ground, and finding its way to spring-reservoirs, or gradually oozing through at a lower level in little rills which continue to flow till the saturated soil becomes drained of its surplus moisture, a process which continues for weeks, and helps greatly to maintain the volume of the river till the next rainfall. This process, it is evident, is only possible where the temperature is mild, the climate moist, evaporation small, and the soil sufficiently porous; and under these circumstances, great fluctuations can only occur from long-continued and excessive rains or droughts. In the hotter tracts of the temperate zones, where little rain falls in summer, we occasionally find small rivers and mountain torrents becoming completely exhausted; such is often the case in Spain, Italy, Greece, and with the Orange, the largest river of South Africa.

In tropical and semi-tropical countries, on the other hand, the year is divisible into one dry and one wet season (see RAIN); and in consequence, the rivers have also a periodicity of rise and fall, the former taking place first near the source, and, on account of the great length of course of some of the tropical rivers, and the excessive evaporation to which they are subjected (which has necessarily most effect where the current is slow), not making itself felt in the lower part of their course till a considerable time afterwards. Thus, the rise of the Nile occurs in Abyssinia in April, and is not observed at Cairo till about midsummer. The fluctuations of this river were a subject of perpetual wonderment to the ancient civilised world, and were of course attributed to superhuman agency; but modern travel and investigation have not only laid bare the reason of this phenomenon, but discovered other instances of it, before which this one shrinks into insignificance. The maximum rise of the Nile, which is about 40 feet, floods 2100 sq. m. of ground; while that of the Orinoco, in Guiana, which is from 30 to 36 feet, lays 45,000 sq. m. of savannah under water; the Brahmaputra at flood covers the whole of Upper Assam to a depth of 10 feet, and the mighty Amazon converts a great portion of its 500,000 sq. m. of silvas into one extensive lake. But even these fluctuations are surpassed comparatively in Australia, where the rivers swell to an enormous height—one of them, the Hawkesbury, having been known to rise 100 feet above its usual level; which, however, is owing to the river-beds in that country being occasionally hemmed in by lofty abrupt cliffs, which resist the free passage of a swollen stream.

The increase from the melting of snow in summer most frequently occurs during the rainy season, so that it is somewhat difficult to determine, with anything like accuracy, the share of each in producing the floods; but in some rivers, as the Ganges and Brahmaputra, the increase from this cause is distinctly observable, as it occurs some time after the rains have commenced, while in the case of the Indus it is the principal source of flood. When the increase from melted snow does not occur during the rainy season, we have the phenomenon of flooding occurring twice a year, as in the case of the Tigris, Euphrates, Mississippi, and others; but in most of these cases the grand flood is that due to the melting of the snow or ice about the source. In illustration of the enormous variation in the volume of rivers subject to periodical rise and fall, we shall give a few instances in which the minimum and maximum delivery per second have been ascertained:

DELIVERY IN CUBIC FEET PER SECOND.

	Minimum.	Maximum.	Average for a Year.
Nile (at Assouan), .	24,000	362,000	101,000
Ganges, . .	36,000	494,000	141,000
Irrawadi, . .	84,000 (?)	1,000,000 (?)	350,000
Brahmaputra, .	146,000	1,800,000 (?)	520,000

The advantages of this periodical flooding, in

bringing down abundance of rich fertile silt—the Nile bringing down, it is said, no less than 140 millions of tons, and the Irrawadi 110 millions of tons annually—are too well known to need exposition here. Islands are thus frequently formed, especially at a river's mouth (see DELTA). Permanent and capacious lakes in a river's course have a modifying effect, owing to their acting as reservoirs, as is seen in the St Lawrence; while the Red River (North) and others in the same tract, inundate the districts surrounding their banks for miles. In tropical countries, owing to the powerful action of the sun, all rivers whose source is in the regions of perpetual snow, experience a daily augmentation of their volume; while some in Peru and Chili, being fed only by snow-water, are dried up regularly during the night.

The course of a river is necessarily the line of lowest level from its starting-point, and as most rivers have their sources high up a mountain slope, the velocity of their current is much greater at the commencement. The courses of rivers seem to be partially regulated by geological conditions of the country, as in the case of the San Francisco of Brazil, which forms with the most perfect accuracy the boundary-line between the granitic and the tertiary and alluvial formations in that country; and many instances are known of rivers changing their course from the action of earthquakes, as well as from the silting up of the old bed. The inclination of a river's course is also connected with the geological character of the country; in primary and transition formations, the streams are bold and rapid, with deep channels, frequent waterfalls and rapids, and pure waters, while secondary and alluvial districts present slow and powerful currents, sloping banks, winding courses, and tinted waters; the incline of a river is, however, in general very gentle—the average inclination of the Amazon throughout its whole course being estimated at little more than 6 inches per mile, that of the Lower Nile less than 7 inches, and of the Lower Ganges about 4 inches per mile. The average slope of the Mississippi throughout its whole length is more than 17 inches per mile, while the Rhone is, with the exception of some much smaller rivers and torrents, the most rapid river in the world, its fall from Geneva to Lyon being 80 inches per mile, and 32 inches from Lyon to its mouth.

The velocity of rivers does not depend wholly on their slope; much is owing to their depth and volume (the latter being fully proved by the fact that the beds of many rivers remain unaltered in size and slope after their streams have received considerable accessions, owing to the greater rapidity with which the water runs off); while bends in the course, jutting peaks of rock or other obstacles, whether at the sides or bottom, and even the friction of the aqueous particles, which, though slight, is productive of perceptible effect, are retarding agencies. In consequence, the water of a river flows with different velocities at different parts of its bed; it moves slower at the bottom than at the surface, and at the sides than the middle. The line of quickest velocity is a line drawn along the centre of the current, and in cases where this line is free from sudden bends or sharp turns, it also represents the deepest part of the channel. The average velocity of a river may be estimated approximately by finding the surface-velocity in the centre of the current by means of a float which swims just below the surface, and taking four-fifths of this quantity as a mean. If the mean velocity in feet per minute be multiplied by the area of the transverse section of the stream in square feet, the product is the amount of water discharged in cubic feet per minute. According to Sir Charles Lyell, a velocity of 40 feet per minute will sweep along coarse sand; one of 60 feet, fine gravel; one of 120 feet, rounded pebbles; one of 180 feet (a little more than two miles per hour), angular stones the size of an egg. The remarkable formation of natural bridges, and a general description of the erosive action of rivers, will be found under WATERFALLS. 'Rivers are the irrigators of the earth's surface, adding alike to the beauty of the landscape and the fertility of the soil; they carry off impurities and every sort of waste débris; and when of sufficient volume, they form the most available of all channels of communication with the interior of continents. . . . . They have ever been things of vitality and beauty to the poet, silent monitors to the moralist, and agents of comfort and civilisation to all mankind.' By far the greater portion of them find their way to the ocean, either directly or by means of semi-lacustrine seas; but others, as the Volga, Sir-Daria (Jaxartes), Amu-Daria (Oxus), and Kur (Araxes), pour their waters into inland seas; while many in the interior of Asia and Africa—as the Murghab in Turkestan, and the Gir in the south of Morocco—'lose themselves in the sands,' partly, doubtless, owing to the porous nature of their bed, but much more to the excessive evaporation which goes on in those regions. The following are a few of the chief rivers in each continent, with the lengths of their courses in English statute miles, and their drainage areas in English geographical square miles (the Thames is given as a standard of comparison):

	Length.	Drainage Area.
EUROPE.		
Thames,	220	6,000
Vistula,	598	57,000
Loire,	598	34,000
Rhine,	690	65,000
Elbe,	787	42,000
Dwina,	1041	106,000
Don,	1104	168,000
Dnieper,	1243	170,000
Danube,	1722	234,000
Volga,	2762	397,000
ASIA.		
Euphrates,	1716	196,000
Ganges,	1933	432,000*
Indus,	2256	312,000
Maykan or Cambodia,	2417	216,000†
Thaluain or Martaban,	2152 }	331,000
Irrawadi,	2532 }	
Hoang ho,	2624	537,000
Obi,	2670	925,000
Amur,	2739	583,000
Lena,	2762	594,000
Yenesei,	3322	785,000
Yang-tze-kiang,	3314	548,000
AFRICA.		
Zambesi,	2400	432,000
Nile,	2578	520,000
AMERICA.		
St Lawrence,	2072	298,000
Rio Bravo del Norte,	2138	180,000
La Plata,	2210	886,000
Mackenzie,	2440	442,000
Amazon,	3545	1,512,000
Mississippi,	3716	982,000

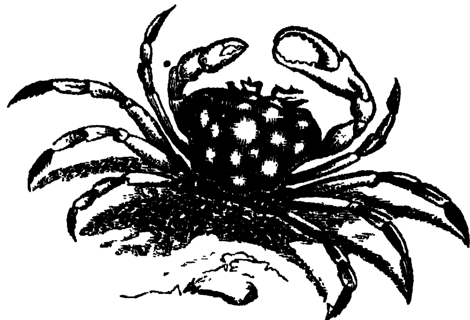
In Law, when a river not navigable forms the boundary of property, it is taken to belong in equal halves to the proprietors on opposite sides; and when both sides belong to one owner, then the whole of the bed belongs to him. In the common case where it is a boundary, an imaginary line, called the *medium filum*, runs down the middle, and all the bed of the river on one side belongs to the proprietor of the land on that side. This rule

* Including basin of Brahmaputra.
† Including basin of Menam.

refers to the soil under the water, which is as absolutely the property of the riparian owner as the banks of the river themselves. As regards the water, it is true that the riparian owner on his side of the middle line has not the absolute property of the water itself, but he can use it to a limited extent—as, for example, to water his cattle, to supply the wants of his house, &c. The right of abstracting quantities of water is limited to this extent, that if, by taking more than the usual quantity required for necessary purposes, the rights of other riparian owners further down are materially injured, then the latter can bring an action to recover damages for such injury. Thus, if a riparian owner or his tenant had a mill on the river which had existed thirty or forty years, and a riparian owner further up has materially diminished the volume of water, an action of damages will be competent. So one owner cannot alter the bed or embank the river so as to injure other owners. With regard to fishing, each riparian owner has a right to fish in his half of the river, and to catch all he can find there, subject to the restrictions of the Fishery Laws. (Paterson's *Fishery Laws of the United Kingdom.*) In Scotland, the riparian owner unless he has a grant from the crown, cannot meddle with salmon so far as net-fishing is concerned, though he may fish for salmon with the rod. It follows that a riparian owner, when fishing with the net or rod, cannot go beyond his own half of the stream; and if he cast his line beyond the mid-stream, he would be liable to an action of trespass. But it is usual for opposite riparian owners to allow each other to fish the whole stream, for this is more convenient to both parties. The restrictions as to the times of fishing and the size of nets are stated under FISHERY. Where a river is navigable, the soil belongs to the crown, and the public have *primâ facie* a right to fish in it, though individuals may prove a title to a several or exclusive fishery there, but the burden of proof lies on such individuals. As between navigation and fishing, the right of navigation is paramount, and the fisherman must yield to the navigator.

The *Poisoning of Rivers* has begun of late years to cause serious concern, in consequence of the extension of manufactures, many of which are situated on the banks of streams, and use such streams as a drain or sewer. No person has a right so to poison or pollute a stream, and if he do so, any of the persons whose lands abut on the stream lower down may bring an action to recover damages. But if these tolerate the nuisance without complaint for twenty, or, at all events, forty years, they are for ever afterwards precluded from complaining. Hence, in most cases, the manufacturers who pollute streams must be able to prove that they have been in the practice of doing so without challenge for twenty, or at most forty years. As, therefore, the law was defective in guarding salmon-rivers from this danger, the English Salmon Fishery Act enacted that all persons who poison streams without a legal right of this kind shall be liable to fine; and, moreover, even when they have the legal right, they must prove that they have used all reasonable means to counteract the ill effect of their refuse. Whoever unlawfully or maliciously puts lime or other noxious material in a pond or water with intent to destroy the fish therein, commits a misdemeanour, and may be sentenced to seven years' penal servitude. In Ireland and Scotland, the law does not materially differ from that of England as to poisoning rivers and streams; and it is an offence to put lime into streams to kill fish.—Paterson's *Fishery Laws of the United Kingdom.* Besides the offences declared by the Salmon Acts of the United Kingdom, there are also similar penalties for poisoning waters, imposed by the Water-works Clauses Act, 10 Vict. c. 17, s. 61; the Public Health Act, 11 and 12 Vict. c. 63, s. 80; and the Nuisances Removal Act, 18 and 19 Vict. c. 121, ss. 23, 24.

RIVER-CRAB (*Thelphusa*), a genus of crabs inhabiting fresh water, and having the carapace quadrilateral, the antennæ very short. One species (*T. depressa*), the *Grancio* of the Italians, is very common in the south of Europe, and is often figured on ancient Greek medals. It was in ancient times, as it still is, an esteemed article of food. It is much used in Italy during Lent. It inhabits muddy lakes and slow rivers. In some it absolutely swarms. It can be kept alive in a damp place for a long time. It is often brought to market tied on strings,



River-Crab (*Thelphusa depressa*).

at such distances as to prevent fighting and mutilation. This crab spends the winter deeply imbedded in the mud.—Other species are common in warm countries. *T. cunicularis* is very abundant on the Ghauts of the Deccan, in India, burrowing in the ground, and running about among the long grass. It 'runs with considerable swiftness, even when encumbered with a bundle of food as big as itself; this food is grass, or the stalks of rice; and it is amusing to see the crabs sitting, as it were, upright, to cut their hay with their sharp pincers, and then waddling off with their sheaf to their holes, as quickly as their side-long pace will carry them.'

RIVER-TERRACES occur in some valleys, and exhibit the action of the river in scooping out its bed when it flowed at a higher level than it does now. The terrace consists of a more or less steep cliff, a few feet, or it may be yards high, with a flat terrace on a level with the top of it. The cliff corresponds to the present bank, and the terrace to the alluvial plain through which the river runs. The cliffs and terraces are repeated several times in some river-basins, and they frequently correspond on the two sides of the valley. They follow the course of the river, sloping downwards, with an inclination similar to the descent of the stream. They differ in this respect from the parallel roads formed by standing water. See GLENROY.

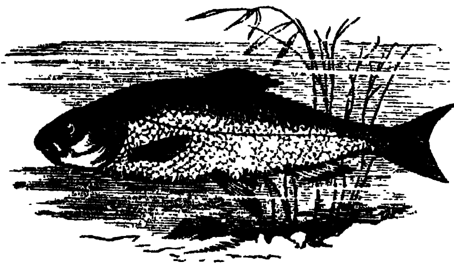
RIVET, a metal pin for connecting two plates of metal or other material together. The rivet is put through holes in both plates, and the projecting ends are then beaten down so as to represent the head of a nail on each side, and thus hold the plates in close contact. Rivets are of most essential importance in boiler and tank making, and in building iron ships. They are often put through the holes and beaten down while red-hot, in order that the contraction of the rivet, as it cools, may produce more intimate contact of the plates. In many cases, great difficulty is experienced

In bringing a pressure upon the head of the rivet, so that the other end can be hammered upon, and it has been sought to do this by machinery. The principle of the *riveting-machine* is simply the bringing a powerful lever to bear upon the head of the rivet, so that the smith can hammer upon the other and softened end without displacing it.

RI'VOLI, a town of Northern Italy, situated on the slope of a hill, on the right of the river Dora, in the province, and 8 miles west of the city of Turin. Pop. 10,131. It is a fine town, surrounded by country houses, is a place of recreation for the Turinese, possesses a royal castle, which was sacked by the French in 1690, and manufactures linens, silk, and liqueurs. R. was presented to the bishops of Turin in 1159 by the Emperor Frederick I.; it gave itself to the House of Savoy in 1247. In 1797, a battle was fought here between the French and Austrians, in which the former were victorious.

RIZZIO. See RICCIO.

ROACH (*Leuciscus rutilus*, see LEUCISCUS), a fish of the family *Cyprinidæ*, very plentiful in many of the lakes, ponds, and slow-running rivers of England and of the south of Scotland. It is also found on the continent of Europe. It is seldom more than a pound in weight, although it has been known to reach five pounds. In form, it is not so deep as some of its congeners. The scales are rather large,



Roach (*Leuciscus rutilus*).

marked with concentric and with radiating lines. The upper parts are dusky-green with blue reflections, passing into silvery-white on the belly, the fins more or less red. The R. is gregarious, and the shoals are often large. It is partially migratory, ascending rivers from lakes—as from Loch Lomond—to spawn. It is not much esteemed for the table; but the capture of it is a favourite amusement of anglers on some English rivers, particularly the Thames. It is generally caught with bait, but sometimes with a small fly. It feeds both on worms, &c., and on vegetable food.

ROAD, in the law of Scotland, is used in the same sense as Highway (q. v.) in England. Road trustees are persons who are authorised by act of parliament to make and manage a particular road, and levy tolls from the public to pay the expense. In England, road trustees necessarily mean the trustees of a turnpike road, on which alone a toll is leviable, the ordinary highways being repairable by the parish, and under the management of the highway surveyor appointed by the parish. In Scotland, by the early statutes, public roads were placed under the general management of the commissioners of supply and justices of the peace; but later local statutes authorised trustees to apportion statute labour amongst the local inhabitants for the repair of highways not turnpike. At length, General Road Acts were passed, 4 George IV. c. 49, 1 and 2 Will. IV. c. 43, and the local acts now incorporate the last general act. Practically, the roads of each county are under a separate statute, which prescribes the modes of management of the roads.

ROADS AND ROAD-MAKING. Roads form a primary element in the material advancement of a nation, being essential to the development of the natural resources of the country. Canals and railways have no doubt, in modern times, superseded to some extent the common highways; still, these retain their importance, were it only as essential auxiliaries.

The Romans were great constructers of roads, and regarded them as of vital importance for conquest and the maintenance of their empire. They are said to have learned the art from the Carthaginians. Except where some natural barrier made it impossible, the Roman roads were almost invariably in a straight line; probably because the chief means of transport then in use were beasts of burden, and not wheeled vehicles, which made the preservation of the level of less consequence. The substantial character of the Roman roads is well demonstrated by the fact, that they have in some instances borne the traffic of 2000 years without material injury. The plan of construction was pretty uniform, being that described in the article on the APPIAN WAY, one of the earliest and most famous of them. They varied in breadth from 15 to 8 feet, and had often raised footpaths at the sides, and blocks of stone at intervals, to enable travellers to mount on horseback.

The roads made by the Romans in Great Britain gradually fell into decay, and the attempts that were now and then made to repair them were insufficient to prevent England falling into a worse state with respect to its highways than most other European countries. In 1285, one of the earliest laws on the subject of roads was passed. It directed that all trees and shrubs be cut down to the distance of 200 feet on either side of roads between market-towns, to prevent the concealment of robbers in them. The first toll for the repair of roads was levied by the authority of Edward III. in 1346, on roads which now form part of the streets of London. In 1555, an act was passed requiring each parish to elect two surveyors of highways to keep them in repair by compulsory labour; at a later period, in place of the compulsory labour, the 'statute labour-tax' was substituted. But long after this, the roads even in the neighbourhood of London were wretchedly bad, and in the other parts of the country, they were still worse. For the most part, indeed, they were mere horse-tracks; the chief advantage in following them being, that they led along the higher grounds, and so avoided bogs. These trackways were usually impassable in winter; being narrow, and in many places so deep and miry as to be liker ditches than roads. So late as 1736, the roads in the neighbourhood of London were so bad that in wet weather a carriage could not be driven from Kensington to St James's Palace in less than two hours, and sometimes stuck in the mud altogether. Much curious information on the state of the roads and means of conveyance in England during the long period which elapsed from the decay of the Roman roads to the middle of the last century, will be found in vol. i. of Smiles's *Lives of Engineers*.

In laying out a new line of road, the skill and ingenuity of the engineer are taxed to make the gradients easy, with as little expense as possible in excavating and embanking (see EMBANKMENT), and to do this without deviating much from the direct course between the fixed points through which the road must pass. In order to do this, an accurate

survey of the tract, including the relative levels of its different parts, and the nature of the strata, is a necessary preliminary. The formation of an extended line of road often involves the construction of extensive bridges, viaducts, and the like, which require the greatest engineering skill.

The importance of easy gradients or inclinations in roads is well understood in a general way; but it gives a more precise idea of it to state that, while, for example, the force requisite to draw a wagon weighing 6 tons along a level macadamised road is 264 lbs., on a road with an ascent of 1 in 70 the force required is 456 lbs., i. e., $\frac{1}{70}$th part of 6 tons over and above 264 lbs. The greatest declivity which can be given to a road, so that horses may move down it with safety in a fast trot, varies according to its nature; for paved roads, 1 in 63—for those which are macadamised, 1 in 35—and for those laid with gravel, 1 in 15, have been considered the limit.

What is the best transverse form for a road, is a much debated question among engineers. All agree that it should be higher in the middle than at the sides, but some think it should be much higher than others. As a road can be better kept clear of water by a slight inclination in the direction of its length, than by any form which can be given to its cross-section, it seems preferable that it should be as nearly flat as possible, because every part of its breadth will then be equally available for traffic; whereas it is almost necessary to keep on the centre of a highly convex road, and consequently wear deep furrows there, by confining the wheels and horses to pretty much the same track. Fig. 1

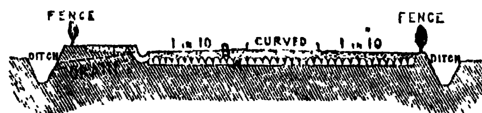


Fig. 1.—Cross Section of a Road.
A, Foundation of rough pavement or concrete; B, Broken stones.

shews a transverse section of a road of an approved form, the slope is 1 in 30, with a few feet in the centre on a flat curve.

Different opinions are also held as to whether the bed upon which the road is to be formed should be flat or rounded; those who prefer it flat considering that there should be a greater depth of material at the centre than at the sides, while others think that the depth should be uniform.

As respects the construction of the road itself, the first point to consider is the foundation. The majority of roads have no artificial foundation. In such cases, the surface on which the road-material is to be laid, is generally made as solid as possible by means of efficient drainage, and by rolling and beating wherever there are embankments formed. It is the question whether or not a road should have a foundation of rough pavement below the broken stone covering, which is the essential point of difference between the two great rival systems of Telford and Macadam. Telford considered it of great importance that there should be such a foundation. He made it of stones varying in depth from nine inches at the centre to three inches at the sides of the road, these being set with their broadest edge downwards, and no stone being more than four inches broad upon the upper edge; upon these were placed a coating of broken stones not exceeding six inches in thickness. The Glasgow and Carlisle and the Holyhead roads are excellent examples of the enduring character of those made on Telford's plan.

In our biographical notice of Macadam (q. v.) will be found a reference to his method of road-making. Suffice it here to say that he preferred a yielding and soft foundation to one which was rigid and unyielding, so that even on boggy ground, if it were but firm enough to allow of a man walking over it, he considered an artificial bottoming quite unnecessary. His roads were formed entirely of angular pieces of stone, of such a size as to pass freely through a ring $2\frac{1}{2}$ inches in diameter. This plan has now fewer advocates than Telford's, or than the one subsequently proposed by Mr Thomas Hughes, where a concrete of gravel and lime is employed for the foundation of the road. But experience has shewn that Macadam's plan of employing angular pieces of stone is superior to every other as a mere covering for roads, whether they have an artificial foundation or not. So popular at one time was the system of macadamising, that expensively paved streets, such as that between Edinburgh and Leith, were torn up to be reformed on the new plan. Dublin has been instanced as an example of the failure of Macadam's plan for the streets of a populous city. There the macadamised streets are in winter constantly covered with mud, and in summer, profuse watering is required to keep them from being overwhelmed with dust. It is curious, however, that the French road-engineers have, in recent years, come to the conclusion, that a covering of broken stone alone is sufficient on the most frequented roads and under all but the very heaviest traffic.

With regard to the kind of stone suitable for covering roads, granite and the different kinds of greenstone and basalt, ordinarily called whinstones, are the only kinds admissible. Sandstone is too easily crushed, limestone is objectionable from its slight solubility in water. The stone employed should be tough as well as hard. Flint is hard enough, but it is brittle, and easily crushed to powder. The object is to get it to bind into a firm mass, and not to roll about, after it has been laid down for some time.

Little need be said about the drainage of roads, notwithstanding its great importance, because it will be apparent from what has been said, that it is in great part secured by the plan on which a road is made. What further drainage a road requires, can, in many situations, be effected by ditches on either side. Where this is not possible, as in the case of portions situated in cuttings more or less deep, proper drains require to be constructed. In such circumstances, a drain is either made down the centre, with branch-drains from the sides running into it; or drains are formed along the sides, with gratings at proper intervals to take in the surface-water. If the ground beneath the road is composed of clay or of any kind of wet soil, under-drainage must be resorted to; and of course, wherever there are footpaths, small drains require to be placed under them, if there is no other means of carrying off the water from the channel between them and the road.

ROANNE, a thriving town of France, in the department of Loire, and, after St Etienne, the most important town in the department for industry and commerce, stands on the left bank of the Loire, which is here navigable, 52 miles by railway north-west of Lyon. Its streets are wide, and its houses handsome. The chief structures are the bridge over the Loire, the public library, and the college buildings. There are important manufactures of muslins, calicoes, and woollen and other fabrics. Ship-building is carried on at the several dockyards. R. is also a most important entrepôt for commerce between the

north and south of France. Pop. (1862) 14,330. Around and within the town are to be found numerous traces of the ancient rule and civilisation of the Romans.

ROANO'KE, a river of Virginia and North Carolina, U.S., formed by the union, at Clarkesville, Virginia, of the Dan and Staunton rivers, which rise in the Alleghanies, flows south-east through the north-eastern portion of North Carolina, and empties into Albemarle Sound. It is navigable for large vessels to Weldon, head of tide-water, 150 miles; its length is 260 miles. In 1861, Albemarle Island, at its mouth, and Plymouth, were taken by the Federal gunboats.

ROARING, a disease of the air-passages of the horse, is characterised by a grating, roaring noise, most noticeable during inspiration, and when the animal is galloped in heavy ground. It usually depends upon wasting of some of the muscles of the larynx; is apt to result from frequent attacks of cold, from strangles, inflammation of the neck-vein, or from tight reining. It constitutes unsoundness, unfits the animal for the satisfactory performance of fast work, is apt gradually to become worse, when a sharper whistling noise is produced, and is seldom curable. In recent cases, a dose of physic should be given, a smart blister applied to the throat, or a seton inserted. As in broken-winded subjects, the breathing is much less distressed when the horse is fed and watered several hours before being required to exert himself. He should have a liberal supply of good oats, but only a limited allowance of hay, which should be given damped. In bad cases, tracheotomy may be performed, and a pipe inserted in the windpipe, with which we have known heavy draught-horses work regularly for years.

ROASTING. All the apparently numerous forms of cookery may be reduced to two, viz., Roasting and Boiling (q. v.). In this general sense, roasting may be held to include broiling, baking, and all other processes which consist essentially in the exposure of food to the action of heat without the presence of any fluid excepting its own natural juices. Chemistry and experience alike teach that the first application of heat in roasting should be powerful and rapid, so as to form an external wall, by hardening the skin, and coagulating the superficial albuminous juices, and thus retain the deep-seated juices as much as possible within the meat. This external crust is usually formed in about 15 minutes, after which the meat should be removed to a greater distance from the fire, and allowed to cook slowly. The evaporation of the internal juices may be further restrained by the free and early application of flour—a process known as dredging. The loss of weight in roasting is greater than that in boiling; but it is mainly due to the melting out of fat and the evaporation of water, while the nutritive matter remains in an easily digestible form in the interior. Rules for calculating the time a joint of given weight requires for roasting, are given in all the ordinary cookery-books. Unless the roasting is continued long enough, those parts which are nearest the centre do not become hot enough to allow the albuminous matters to coagulate, and hence they appear red, juicy, and *underdone*, as it is commonly called. The exact nature of the chemical changes which occasion the peculiarly agreeable odour of roasted meat is still unknown.

ROB, the Spanish name of a conserve of fruits. It is derived from the Arabic *roob*, signifying the juice of fruit, boiled to a sufficiently thick consistency to keep, and is supposed to have been taken from its similarity to the saccharine pulp of the locust-pods, called *Al-garoba* by the Moors. The juices of strawberries, raspberries, gooseberries, currants, &c., are boiled with sugar until they form *robs*, and are in that state used for flavouring drinks, &c.

ROBBERY is larceny from the person, preceded by violence or the fear of violence. By the present statutory law of England and Ireland, 24 and 25 Vict. c. 96, whoever robs a person is guilty of felony, and liable to penal servitude, not exceeding fourteen years, and not less than three years; or to imprisonment not exceeding two years, with or without hard labour. If, on the trial for robbery, it appear to the jury that the party charged did not commit the crime of robbery, but committed an assault with intent to rob, the party shall not be acquitted, but shall be found guilty of the assault with intent to rob. The punishment of an assault with intent to rob is penal servitude for three years, or imprisonment not exceeding two years. To constitute simple robbery, there must be what is called asportation, or a seizure of the goods. Thus, where the thief, in pulling a purse out of a pocket, could not disentangle it from keys in the pocket, and so the purse never left the pocket, it was held not robbery; but where a thief detached a lady's earring, which became lost in the curls of her hair, it was held to be robbery. In the law of Scotland, robbery also means the violent or forcible taking away of property from the person, while stouthrief means the same offence in or near a dwelling-house.

ROBERT OF GLOUCESTER, an old English (metrical) chronicler, of whom absolutely nothing is known, except that he was alive about the time of the great battle of Evesham (1265). Robert's work is a 'history' of English affairs from the arrival of the fabulous Brutus down to the end of Henry III.'s reign; and is valuable partly for its matter (though that is in the main taken from Geoffrey of Monmouth and William of Malmesbury), but more for the language, which is there seen in its transition from Anglo-Saxon to the English of Chaucer and Wycliffe. It is written in verse, contains more than 10,000 lines, and—if we may judge from the numerous copies that were made of it—was very popular in the middle ages. The principal extant manuscripts are the Bodleian, the Cottonian, and the Harleian. The Chronicle was printed by Hearne, in 2 vols., 1724, a reprint of which appeared in 1810.

ROBERT I. (of Scotland). See BRUCE.

ROBERT II., king of Scotland, 1371—1390, was born March 2, 1316, only two years after the battle of Bannockburn. His father was Walter Stewart, and his mother, Marjory, only daughter of Robert the Bruce. R. lost both his parents in infancy. During the disastrous reign of his uncle, David II., he was one of the most prominent of the patriotic nobles of Scotland, acting as regent, or joint-regent, during the minority and exile of his sovereign. He was present at the fatal battles of Halidon Hill (q. v.) and Neville's Cross (q. v.). On the death of David, he obtained the crown, and became the founder of the Stewart dynasty, in virtue of the law of succession adopted by the Council of Estates held at Ayr in 1315. Partly from disposition, and partly from the infirmities of age, R. proved a peaceable, though not exactly a pusillanimous ruler. Such wars as were waged with England, were not only conducted, but actually organised, by his powerful and intractable barons, particularly the Earls of Douglas, Mar, March, and Moray, who shaped the policy of the country very much according to their pleasure. The misery inflicted on both sides of the borders by the raids of these warlike chiefs, and the reprisals of the English wardens—

the Percies and others—was frightful; famine and pestilence became chronic; but the most celebrated incidents of R.'s reign were the invasions of Scotland by an English military and naval force under the command of the Duke of Lancaster ('old John of Gaunt, time-honoured Lancaster'), in 1385, and again by King Richard II. himself, in 1386, which wasted the land as far as Edinburgh and Fife; and the grand retaliatory expedition of the Scotch in 1388, when two armies invaded and devastated England: the larger, under the Earls of Fife and Strathearn, Archibald Douglas, surnamed the Grim, Lord of Galloway, and the Earls of Mar and Sutherland, penetrating by way of Carlisle; the smaller, under James Earl of Douglas (the 'doughty Douglas'), and the brothers Dunbar, Earls of Moray and March, by way of Northumberland. Both were completely successful. What gives a special interest to the movements of the smaller body, is the fact, that on its return home it fought and won, though at the expense of the life of its gallant leader, the brilliant battle of Otterburn, July 21, 1388. See CHEVY CHASE. R. died at his castle of Dundonald, in Ayrshire, April 19, 1390. According to Buchanan (not, however, a very accurate historian), he laboured honestly to suppress the internal disorders of the country; but, like most of the Stewarts, he was profligate in his habits. His favourite mistress, Elizabeth Mure of Rowallan, became his second wife.

ROBERT III., king of Scotland, son of the preceding, was born about 1340. His baptismal name was John, but this name, for reasons not ascertained, was changed on his accession to the throne in 1390, by an act of the Scottish Estates or parliament. His imbecility as a ruler virtually placed the reins of government in the hands of his ambitious brother, Robert, Earl of Menteith and Fife, whom, in 1398, he created Duke of Albany—during whose regime the Scottish barons first began to exercise that anarchic and disloyal authority, which, in the reigns of the first three Jameses, threatened to destroy the power of the sovereign altogether. The principal events in R.'s reign were the invasion of Scotland, in 1400, by Henry IV. of England, who, at the head of a large army, penetrated as far as Edinburgh, but did not inflict much injury on the country, more, however, from clemency than impotence; and the retaliatory expedition of the Scotch, in the following year, under Archibald Douglas, son of the Grim Earl, which resulted in the terrible disaster at Homildon Hill (q. v.). R. had two sons, the eldest of whom was David, Duke of Rothesay, a youth not destitute of parts, but shockingly licentious. As long as his mother lived, he kept within bounds, comparatively speaking; but after her death, says Buchanan, 'he gave an unbridled licence to his passions; laying aside fear and shame, he not only seduced married ladies and virgins of good family, but those whom he could not entice, he forced to his embraces.' Albany received orders from the king to act as his guardian, and after a short time, starved him to death in his castle of Falkland—for which he underwent a mock-trial by his own creatures, and was of course declared innocent. Sir Walter Scott has given the traditionary version of this tragedy in his romance, *The Fair Maid of Perth*. R. now became anxious for the safety of his younger son, James; and after consulting with Wardlaw, Archbishop of St Andrews, he resolved to send him to France; but, while proceeding thither, he landed at Flamborough, in Yorkshire, either to avoid a storm or to recover from sea-sickness, and was taken prisoner by the English, in 1405. When his father received the melancholy news, he gave way to paroxysms of grief, and died at Rothesay in the following year.

ROBERTSON, FREDERICK WILLIAM, M.A., an English preacher, was the son of a Scotch gentleman, Captain Frederick Robertson of the Royal Artillery, and was born in London 3d February 1816, in the house of his grandfather, Colonel Robertson. At the age of nine, he was sent to the grammar-school of Beverley, in Yorkshire, where he remained for a few years, and then accompanied his parents to the continent, where he became a proficient in French. In 1832, he entered the rector's class at the Edinburgh Academy, and there competed, we are told, 'all but successfully,' for the highest classical honours of the institution with James Moncrieff (now Lord Advocate for Scotland). Next year, R. proceeded to the Edinburgh University, and while there, had for private tutor the Rev. Charles Terrot, subsequently Bishop of the Scottish Episcopal Church in the same city. He was originally designed for the bar, but the study of law did not prove interesting to him, and he would gladly have become a soldier, for he always felt (as he afterwards confessed) 'an unutterable admiration of heroic daring;' but certain difficulties intervened in the way of obtaining a commission, and R., in obedience to the wish of his father, entered Brasenose College, Oxford, to study for the church, in 1836. His life had all along been marked by its singular purity and depth of religious feeling; hence his new career inspired him with no regret, but rather with a high resolve to be worthy of his calling. His first appointment was to the curacy of St Maurice and St Mary Calendar, but his health broke down in the course of a year, and he was compelled to visit the continent. On his return to England, he was for a time curate to the incumbent of Christ Church, Cheltenham, whence, in the beginning of 1847, he removed to St Ebbs, Oxford, and was just beginning to attract the notice of the undergraduates at Oxford, when he was offered the incumbency of Trinity Chapel, Brighton. His 'career' in Brighton—though it is perhaps wrong to describe a life so pure, delicate, unselfish, devoted as his, by a term expressive of vulgar ambition—was brief but glorious. For six years he continued to preach sermons, the like of which, for blending of delicacy and strength of thought, poetic beauty, and homely lucidity of speech, had perhaps never been heard before in England. R. was unhappily (for his comfort) not very 'orthodox;' consequently, he was long misunderstood, and vilified by the 'professedly religious portion of society;' but so true, so beautiful was his daily life and conversation, that he almost outlived those pious calumnies, and his death (from consumption, August 15, 1853) threw the whole town into mourning. Three volumes of his sermons, partly in the form of jottings, however, have successively appeared since his death, and have gone through numerous editions. More recently, a volume of expository lectures on the Epistle to the Corinthians was published, and another on parts of the Old Testament is promised. His *Lectures and Addresses on Literary and Social Topics* contain passages of faultless beauty and refinement; but as they were delivered to mixed audiences, and never intended for publication, they do not perhaps exhibit that rigorous intellectual grasp of a subject, or that strong and searching criticism of which their author was so capable. A biography of R. is promised.

ROBERTSON, WILLIAM, the historian, was born in the year 1721, in the county of Edinburgh, and in the parish of Borthwick, of which his father was minister. He went to school at Dalkeith, a few miles distant from his home; but in 1733, his father's appointment to a charge in Edinburgh gave

him the opportunity of attending school and college there. He was licensed as a preacher in 1741, and in 1743 was ordained to the parish of Gladsmuir, where the battle of Prestonpans was to be fought two years afterwards. In 'the '45,' he shewed his zeal for the government cause by joining a body of volunteers formed in Edinburgh; and when the majority of his comrades saw that it was useless for them to attempt to defend the town, he, with a few whom he had infected with his ardour, went to offer their services to Sir John Cope. The latter, conscious that he had already too many elements of imperfect discipline in his army, had the prudence to decline this offer. R. afterwards became a leader in what was called 'the Moderate' side in the ecclesiastical courts; and in 1758 was promoted to one of the Edinburgh charges, where he had increased opportunities of influence. In 1759, he published his celebrated *History of Scotland*. He avowedly passed over the earlier periods, speaking of them as 'dark and fabulous,' which no doubt they were in the hands of those who had treated them; but it may be regretted that R. did not bring his acuteness to bear on the materials for their elucidation. In 1762, he was made Principal of the university of Edinburgh. In 1769, he published the *History of the Reign of the Emperor Charles V.*, to which he prefixed a *View of the State of Society in Europe from the subversion of the Roman Empire to the beginning of the Sixteenth Century*. This is the most valuable of his works. The field has been often since gone over by authors who have discovered much new material, but all the use they have made of it has become a sort of tribute to the natural sagacity of Robertson. His *History of America* was published in 1777. These works are admirable for their elegant and vigorous style. R. died in 1793. He was a genial man, with a large circle of friends. He had great conversational powers, and was reputed to be fond of displaying them. Interesting notices of his early life will be found in the autobiography of his friend Dr Carlyle, and a sketch of the closing years is given in Lord Cockburn's *Memorials of his Life and Times*.

ROBESPIERRE, MAXIMILIEN MARIE ISIDORE DE, was born 6th May 1758, at Arras, where his father was an unsuccessful advocate. Having distinguished himself at the college of his native place, he was sent through the influence of a canon of the cathedral of Arras, to complete his education in Paris, at the College of Louis le Grand, where, by a singular chance, he found himself a fellow-student with Fréron, and Camille Desmoulins. In his studies, he was noted for diligence, regularity, and intelligence; and on the completion of his course at college, he devoted himself to the study of jurisprudence. After some years thus passed, he returned to Arras, to follow the profession of his father. In this his success was decided; and previous to the commencement of his more public career, he had become a person of considerable local note. While sedulously attending to his professional duties, he cultivated literature, not wholly without distinction; and in 1783 became a member of the Academy of Arras. Of the verses which, at this time, he seems to have been fond of writing, some curious fragments are preserved. Having, it is said, in discharge of his duty as member of the criminal court, been obliged to condemn a culprit to death, he resigned his situation on a point of conscientious objection to the barbarity of capital punishment—an incident sufficiently piquant in its contrast with subsequent portions of his history. On the memorable convocation of the States-general in 1789, he had local influence sufficient to secure his election as one of the deputies of the *tiers-état*, in which capacity he immediately repaired to Versailles. In the Assembly, he was for some time of little account; but gradually he made for himself a position, and nice observers noted in him a quality of fanatical earnestness and conviction, in virtue of which they surmised for him a great career. 'This man,' said Mirabeau in particular, 'will go far, for he believes every word he says.' (*Cet homme ira loin, car il croit tout ce qu'il dit.*) Though in the Constituent Assembly he spoke frequently, and—despite the disadvantages of a mean person, a harsh shrill voice, and an ungainly manner—always with increasing acceptance, it was outside as a popular demagogue and leader in the famous Jacobin Club that his chief activity was exerted; and in this field his influence speedily became immense. After the death of Mirabeau, whose giant figure, whilst he lived, seemed to dwarf all meaner men, his importance became more and more recognised; and from this time forward till his death, his biography is in effect the history of the revolution. In May 1791, he proposed and carried the decree by which members of the Assembly were excluded from a place in the legislature which succeeded; a measure obviously disastrous, as deteriorating the quality of the Assembly, and more and more insuring its subjection to the Jacobins, of whom R. was now the idol. His early aversion to capital punishment has been spoken of; and it is curious enough to be noted, *en passant*, that now, on the 30th May, he delivered an oration against it in the Assembly, denouncing it as 'base assassination.' On the dissolution of the Constituent Assembly in October 1791, R., now famous, revisited his native town, where he was received with enthusiasm; an escort of the National Guard did honour to his entrance, and a general illumination of the place testified the admiration of the citizens for their deputy. After a stay of seven weeks, he returned to Paris, and resumed his activity as a leader of the Jacobin Club. In the *émeute* of 10th August following, by which the king was dethroned, he took no prominent part; and though his complicity is suspected in the September massacres which ensued, no very distinct share in the infamy has ever yet been proved against him. To the National Convention, which was now formed, he was returned at the head of the Paris deputies; and as recognised chief of the extreme party called the Mountain, he was one of the main agents in procuring the execution of the king, which took place in December 1792. In the following year occurred his final struggle with the Girondists, who had twice before attacked him with a view to compass his destruction, and the chief men among whom he now triumphantly sent to the scaffold. The period of 'the Terror' followed: Marie Antoinette and the infamous Duke of Orleans were the first victims; Pétion, Danton, and Camille Desmoulins were next immolated, on a suspicion of favouring a reactionary policy; and for months, under the so-called Committee of Public Safety, Paris became the scene of an indiscriminate *quasi*-judicial slaughter, in which some thousands of lives were sacrificed. With these enormous atrocities, the name of R., along with those of his friends, Couthon and St Just, remains peculiarly associated. In the midst of the horror, took place, on 8th June 1794, that strange *Fête de l'Etre Suprême*, in which, in the name of the Republic, the existence of a Deity was decreed—a day of triumph for R., who, conspicuous as the first man in France, presided at the solemn mummery. But the end was near; men were weary of 'the Terror,' and the general sense of insecurity it induced; R. had many enemies; in particular, the numerous friends of Danton were

eager to avenge his death; a conspiracy was organised against 'the tyrant,' as he was now called, and after a scene of fierce tumult in the Convention, his arrest was accomplished. A rescue by the populace followed, but he lacked the courage and promptitude to turn the opportunity to account; whilst he hesitated, his enemies acted, and in July 1794, he closed his career on the scaffold to which he had sent so many others.

Though without great and heroic qualities, R. can scarcely have been the mean and contemptible creature he has not unfrequently been represented. The instant effect of his oratory we know; and even as read, his speeches command respect for the mental power they exhibit. The subtlest practical tact and judgment he must plainly have possessed; and though timid in his own person, he was dexterous to appropriate the results obtained by the boldness of others. In principle, he was severe and consistent; and the title of 'Incorruptible,' which he early acquired, seems throughout to have been thoroughly deserved. In private life, he was amiable; and though he waded to his public ends through blood, he had not the savage joy in the shedding of it which it has been common to attribute to him. He was callous, not actively cruel; and during the time of 'the Terror,' it is simply the truth, that he was rather reluctantly acquiescent, than active in the atrocities for which he has since been held above all others responsible. 'Death—always death!' he is said to have frequently exclaimed in private, 'and the scoundrels throw it all on me! What a memory shall I leave behind me, if this lasts! Life is a burden to me.' For a candid view of the character on this and its other sides, the more curious reader may be referred to the work on the subject by Mr G. H. Lewes—*Life of Maximilien Robespierre, with Extracts from his Unpublished Correspondence* (London, Chapman and Hall, 1849). See also the Histories of Thiers, Mignet, Carlyle, Michelet, Louis Blanc, and quite recently Ernest Hamel's *Vie de Robespierre* (Par., 1865).

ROBIN GOODFELLOW, a name given in England to a domestic spirit or fairy, analogous in character to the *Nisse God-dreng* of Scandinavia, the *Knecht Ruprecht*, i. e., Robin, of Germany, and the *Brownie* of Scotland. Roguery and sportiveness were the characteristics of this spirit; and in the reign of Elizabeth, his existence was so generally credited, that he was 'famozed in every old wives chronicle for his mad merrye prankes.' It was from the popular belief in this spirit that Shakspeare's *Puck* was derived. From the early ballads concerning R., we learn that he was the offspring of a 'proper young wench by a hee-fairy,' who was no less a person than Oberon, king of Fairyland. In his youth, R. displayed such mischievous tricks that his mother found it necessary to promise him a whipping. He ran away from home, and engaged with a tailor, from whom he also eloped. When tired, he sat down, and fell asleep, and in his sleep he had a vision of fairies. On awaking, he found lying beside him a scroll, evidently left by his father, which, in verses written in letters of gold, informed him that he should have anything he wished for, and also the power of turning himself into various shapes; but he was to harm none but knaves and queans, and was to 'love those that honest be, and help them in necessity.'

As a specimen of his 'mad prankes,' R. went one day to a wedding as a fiddler, and was a welcome guest; but in the evening 'then hee beganne to play his merry trickes in this manner. First, hee put out the candles, and then being darke, hee strucke the men good boxes on the eares; they, thinking it had beene those that did sit next them, fell a-fighting one with the other, so that there was not one of them but had either a broken head or a bloody nose. At this, Robin laughed heartily. The women did not scape him, for the handsomest he kissed: the others he pinched, and made them scratch one the other, as if they had beene cats. Candles being lighted againe, they all were friends, and fell againe to dancing, and after to supper. Supper being ended, a great posset was brought forth. At this, Robin's teeth did water, for it looked so lovely that hee could not keepe from it. To attaine to his wish, he did turne himself into a beare: both men and women seeing a beare amongst them, ranne away, and left the whole posset to Robin. He quickly made an end of it, and went away without his money, for the sport hee had was better to him than any money whatsoever.'

Although R. was a sprite particularly fond of disconcerting and disturbing domestic peace, he was believed to be easily propitiated. If a bowl of milk, or curds and cream, were duly laid out for him, he would at midnight perform for the servants many household duties. If this were neglected, R. would revenge himself by pinching and otherwise annoying the inmates. The following passage in Shakspeare's *Midsummer Night's Dream* fully describes R.'s peculiarities:

> Either I mistake your shape and making quite,
> Or else you are that shrewd and knavish sprite
> Call'd Robin Goodfellow: are you not he
> That frights the maidens of the villagery;
> Skims milk, and sometimes labours in the quern,
> And bootless makes the breathless housewife churn;
> And sometime makes the drink to bear no barm;
> Misleads night-wanderers, laughing at their harm?
> Those that Hobgoblin call you, and sweet Puck,
> You do their work, and they shall have good-luck.

The *Mad Pranks and Merry Jests of Robin Goodfellow* have been reprinted from the edition of 1628, by the Percy Society, in 1841.

ROBIN HOOD'S BAY. See YORKSHIRE.

ROBI'NIA, a genus of trees and shrubs of the natural order *Leguminosæ*, suborder *Papilionaceæ*, having a 4-fid calyx, with the upper segment divided into two; stamens, nine united, and one free; the pod long and many-seeded. The species are widely diffused over the world. The most important is a North American tree, sometimes called the *Locust Tree* (q. v.), also known as the *False Acacia*, or *Thorn Acacia*, often simply designated *Acacia*. It was raised from seed in France by John Robin, about the year 1600, and gradually spread over the warmer parts of Europe and the south of Siberia. On account of its quick growth, its spines, and its property of submitting to be clipped into any form, it is very suitable for hedges. In the south of Europe, it succeeds well as a timber tree, but in more northern regions, it suffers from frost in severe winters; and in Britain it often suffers from frost, owing to the imperfect ripening of the wood in summer. The wood is compact, hard, and takes a fine polish; for many purposes, it is scarcely inferior to oak, which it rivals in toughness and strength. It does not readily rot in water, and is used for ship-building. The tree is very ornamental, and of rapid growth. It is found wild in abundance from the Alleghanies to the Rocky Mountains. Its leaves are pinnate, with 9—13 thin and smooth leaflets. The flowers are fragrant and white, in large pendulous racemes. The roots throw up many suckers; and are very sweet, affording an extract resembling liquorice. An agreeable syrup is also made from the flowers.—*R. viscosa* is a smaller tree, but even more ornamental, a native of the south-western parts of the Alleghany Mountains. It has rose-

coloured scentless flowers. The young branches are viscid.—The Rose Acacia (*R. hispida*) is a native of the south-western ranges of the Alleghanies, and is a highly ornamental shrub, with hispid branches, and large rose-coloured scentless flowers.—*R. Caragana* is a native of the south-east of Europe, and is planted for hedges at St Petersburg, where it spreads like an indigenous plant.

ROBINS, Benjamin, a celebrated English mathematician and artillerist, was born at Bath in 1707, of parents who belonged to the Society of Friends, and who were in such poor circumstances as to be unable to give their son a good education. R., however, having obtained a little instruction in mathematics, prosecuted this branch of science with great zest, and having acquired a good elementary knowledge of it, he removed, by the advice of Dr Pemberton, to London, where he set up for a teacher of mathematics. During his leisure hours, he improved himself in his favourite subject by reading the works of the ancient and modern geometers, and by the study of the Latin, Greek, and several modern languages. He also published several mathematical treatises, which gained for him considerable reputation. R. next commenced the series of experiments on the resisting force of the air to projectiles, which has gained him so much celebrity, varying his labours by the study of fortification; a science with which he obtained a practical acquaintance by visiting many of the most celebrated works of this class in Flanders. In 1734, he demolished, in a treatise entitled *A Discourse concerning the Certainty of Sir I. Newton's Method of Fluxions*, the objections brought by the celebrated Berkeley, Bishop of Cloyne, against Newton's principle of ultimate ratios. His great and valuable work, the *New Principles of Gunnery*, upon the preparation of which he had spent an enormous amount of labour, appeared in 1742, and produced a complete revolution in the art of gunnery. Previous to R.'s time, it had never been attempted to estimate the velocity of balls otherwise than by the ordinary parabolic theory of Galileo (see Projectiles). R. suggested two methods for obtaining this information—viz. (1), by finding experimentally the initial force of fired gunpowder confined to a certain space, and the law of the decrease of this force as the space increased, thence calculating the velocity which would be imparted to a body of given weight; and (2) by the *Ballistic Pendulum*. The second method has been found in practice to be much preferable for accuracy. R., in the course of his experiments, also discovered and explained the curvilinear deflection of a ball from a vertical plane. Some of his opinions having been questioned in the *Philosophical Transactions*, R. ably replied to these objectors, and also wrote several dissertations on the experiments made by order of the Royal Society in 1746—1747, for which he received their annual gold medal. In consideration of his able defence of the policy of the then government, by means of pamphlets which he wrote and published from time to time, he received (1749) the post of 'Engineer-in-general to the East India Company;' but his first undertaking, the planning of the defences of Madras, was no sooner accomplished, than he was seized with a fever, and though he recovered from it, his vital energy had been exhausted, and he died July 29, 1751. R. was considered as one of the most accurate mathematicians of his time. His mathematical works were collected after his death, and, along with the details of his latest experiments in gunnery, were published by Dr Wilson in 1761. It may also be mentioned that R. had some share (to what extent is now unknown) in the composition of Anson's *Voyage Round the World* (1740—1744).

ROBINSON, Rev. Edward, D.D., LL.D., philologist and biblical scholar, was born at Southington, Connecticut, April 10, 1794, graduated at Hamilton College, Clinton, in the state of New York, in 1816, where he was engaged as tutor, and in pursuing his studies until 1821, when he went to Andover, Massachusetts, to superintend the printing of an edition of the first six books of the *Iliad*, previous to which he had married, and become a widower. He studied Hebrew with Professor Stuart at Andover, to whom he became an assistant professor. In 1826, he began four years' travel and study in Europe, where he married Miss Therese A. L. von Jakob, daughter of a professor at Halle. Returning in 1830 to Andover, he was appointed Extraordinary Professor of Sacred Literature, and librarian, but resigned in 1833, removed to Boston, and in 1837 was appointed Professor of Biblical Literature in the Union Theological Seminary, city of New York. At this period, he made, in company with Rev. Eli Smith, an extensive survey of Palestine, of which he gave an account in his admirable work, entitled *Biblical Researches in Palestine and Adjacent Countries* (3 vols. 8vo, Halle, London, and Boston, 1841)—which will always remain a standard work on the subject. He entered upon the active duties of his professorship in 1840; and in 1852 made a second visit to Palestine, of which he published an account in 1856. His other works are a translation of Buttman's *Greek Grammar*, 1832 and 1850; *Greek and English Lexicon of the New Testament*, 1836 and 1850; *Harmony of the Four Gospels*, in Greek, 1845, and in English, 1846. He was also editor of the *Biblical Repository*, *Bibliotheca Sacra*, Calmet's *Bible Dictionary*, a translation of Gesenius's *Hebrew Lexicon*, &c., and was an active member of geographical, oriental, and ethnological societies. He died in 1864.

ROBINSON, Mrs Therese Albertine Louise, wife of the preceding, and daughter of Professor von Jakob, known to the world of letters as 'Talvi,' a name composed of her initials, was born at Halle, Germany, January 26, 1797. In 1807, she accompanied her father to Russia, where he had an appointment as professor in the university of Kharkov. In 1810 they removed to St Petersburg, where she learned modern languages and history. In 1816, they returned to Halle, and there she studied Latin, and wrote a volume of tales, published in 1825 under the title of *Psyche;* and under the signature of 'Ernest Berthold,' translations of Sir Walter Scott's *Black Dwarf* and *Old Mortality*, and also two volumes of Servian popular songs—*Volkslieder der Serben.* In 1828, she was married to Professor Robinson, and in 1830 accompanied him to America, where she studied the languages of the aborigines, translated Pickering's *Indian Tongues* into German, and contributed a *Historical View of the Languages and Literature of the Slavic Nations* to the *Biblical Repository.* In 1837, she accompanied her husband back to Germany, and published *An Essay on the Historical Characteristics of the Popular Songs of the German Nations, The Poems of Ossian not Genuine*, a *History of Captain John Smith*, in German, also *The Colonisation of New England*, which was translated into English by the younger Hazlitt. Returning to New York, she has written, in English, *Heloise, or the Unrevealed Secret; Life's Discipline, a Tale of the Annals of Hungary; The Exiles;* and numerous contributions to German and American periodicals.

ROBISON, John, a celebrated Scotch natural philosopher, was born at Boghall, in the parish of Baldernock, Stirlingshire, in 1739, and after a preliminary training at the grammar-school of Glasgow,

entered the university of that city in November 1750, and took his degree in 1756. He was engaged to accompany Edward, Duke of York, to sea, as his instructor in mathematics and navigation; but this arrangement being abandoned, R. accompanied in a similar capacity the son of Admiral Knowles (1758—1762). He afterwards obtained the responsible office of taking charge of the Harrison (q. v.) chronometer in its trial trip across the Atlantic; and on his return (April 1763) from this expedition, for which he was never remunerated, he returned to Glasgow to commence the curriculum of divinity study. He happened, however, at this time to renew his acquaintance with James Watt and Dr Black, and his former strong predilection for physical science underwent a vigorous revival, and was cultivated with such success that in 1766, when Black was transferred to the university of Edinburgh, R. succeeded him. In 1770, his old friend, Admiral Knowles, having been recommended by the British government to the czarina Catharine II. as the fittest person to reform the shipbuilding and naval administration of Russia, accepted the appointment of President of the Russian Board of Admiralty, and persuaded R. to accompany him as secretary. R. remained in Russia for several years, and rose high in the opinion of government, which conferred upon him various offices, both honourable and profitable. But the chair of Natural Philosophy in Edinburgh having become vacant in 1773, R. was unanimously elected, and despite the extremely tempting and flattering offers of the Russian government, he accepted the chair (1774). On leaving Russia a pension was settled on him, and he agreed to take charge of two or three of the young cadets, his former pupils. To the performance of his professorial duties, R. brought talents and acquirements of a high order; his knowledge was extensive, and included the latest discoveries of both British and foreign philosophers; his language was precise and fluent; and his views of his subject ingenious and comprehensive. But, on the other hand, his diction was too rapid, and he unfortunately disapproved of experiments, and employed them as little as possible in illustrating the great principles of natural science. In 1783, R. joined with Principal Robertson and other eminent men in reviving the old literary and scientific society (which had been founded in 1739 under the direction of Mr Maclaurin, and had been in a languishing state since 1756), which was now incorporated by royal charter, and became the Philosophical Society. The *Transactions* of this Society contain several works from R.'s pen, which are held in high esteem; and his contributions to the *Encyclopædia Britannica* were the means of elevating that work to the rank of a valuable and trustworthy book of reference. He published Black's *Lectures on Chemistry* (1803), and also a portion of a work of his own, entitled *Elements of Mechanical Philosophy*, which, together with some MSS. intended to form part of a second volume, &c., was re-published by Sir David Brewster in 4 vols. (1822), with notes. On January 28, 1805, he was seized with a severe recurrence of a former illness, brought on by a cold, and died two days afterwards.

ROB ROY, the popular name of ROBERT M'GREGOR, a celebrated Scottish outlaw, whose singular adventures entitle him to be considered the Robin Hood of Scotland. He was born between the years 1657 and 1660, and was the second son of Donald M'Gregor of Glengyle, by a daughter of Campbell of Glenlyon. R. R., in consequence of the outlawry, in 1660, of the clan M'Gregor by the Scottish parliament, assumed the name of Campbell. In Gaelic, the name *Roy* signifies *red*, and was applied to him from his ruddy complexion and colour of hair. R. R. received a fair education, and in his youth was distinguished for his skill in the use of the broadsword, in which the uncommon length of his arms was of much advantage. It was said that he could, without stooping, tie the garters of his Highland hose, which are placed two inches below the knee. Like many of the Highland proprietors of the period, R. R. dealt in grazing and rearing black-cattle for the English market. He took a tract of land for this purpose in Balquhidder; but his herds were so often stolen by banditti from Inverness, Ross, and Sutherland, that, to protect himself, he had to maintain a party of armed men, to which may be attributed the warlike habits he afterwards acquired. He also protected his neighbours' flocks, in return for which he levied a tax, which went under the name of 'black mail.' R. R. married a daughter of the laird of Glenfalloch, shortly after which he acquired the estates of Craig Royston and Inversnaid, near the head of Loch Lomond. In consequence of losses incurred in unsuccessful speculations in cattle, for which he had borrowed money from the Duke of Montrose, R. R. lost his estates, which were seized by the duke, on account of this debt. R. R. rendered desperate by his misfortunes, collected a band of about twenty followers, and made open war upon the duke, sweeping away the whole cattle of a district, and intercepting the rents of his tenants. That this could happen at so late a period, and in the immediate neighbourhood of the garrisons of Stirling, Dumbarton, and Glasgow, appears almost incredible; but R. R. enjoyed the protection of the Duke of Argyle and the respect of the country people, who gave him timely information of the designs of his enemies. Numberless stories are still current in the neighbourhood of Loch Lomond and Loch Katrine of his hairbreadth escapes from capture by the troops. At one time, a reward of £1000 was offered for his head, in consequence of which he was obliged to take shelter in a cave at the base of Ben Lomond, on the banks of the lake, which had in former times afforded a secure retreat to Robert the Bruce. Many instances have also been recorded of his kindness to the poor, whose wants he often supplied at the expense of the rich. R. R. was not the commonplace *cateran* that many people think him. He gave his sons a good education, and died peaceably in his bed about the year 1738. His funeral was attended by all the people of the district, with the exception of the partisans of his enemy, the Duke of Montrose. R. R.'s exploits have been immortalised by Sir Walter Scott in his celebrated novel of *Rob Roy*, written in 1817.

A circumstance little known in connection with R. R.'s literary tastes is, that in the list of subscribers to Keith's *History of the Affairs of Church and State in Scotland*, published in 1734, there occurs the name 'Robert Macgregor, *alias* Rob Roy.'

ROC or **ROCK**, a fabulous bird, represented as of immense size, and 'able to truss an elephant' in its talons. It is perhaps enough to refer to the *Arabian Nights' Entertainments*, as to the size and power of the Roc. A belief in its existence prevailed throughout the middle ages, and it is noticed in many works of that period. The fables concerning the R. may have originated in exaggerated stories of some of the great eagles, or of the Lammergeier.

RO'CAMBOLE (*Allium scorodoprasum*), a plant of the same genus with garlic, onion, leek, &c., and nearly allied to garlic, which it resembles in its habit; although larger in all its parts. The upper part of the stem is in general spirally twisted before flowering. The root forms rounder cloves than

those of garlic, and of much milder flavour; the umbels are also bulbiferous. R. has long been cultivated in kitchen-gardens, although it has never become very common in them. It is a native of sandy soils in Denmark and other countries near the Baltic.

ROCCE'LLA. See ARCHIL.

ROCH or **ROCK ALUM**, a name formerly given to pure alum in mass; but it is now applied to a particular variety found at Civita Vecchia, in the Roman States. It is a kind of native alum, free from iron, but having a reddish colour, derived from the soil in which it is found. It is also called Roman, and red alum. A factitious kind is now in general use, made of common alum reddened with Armenian bole.

RO'CHDALE, a thriving manufacturing town of Lancashire, a market-town and parliamentary and municipal borough, in the valley of the Roche, and built on both sides of that stream, 11 miles north-north-east of Manchester, and 200 miles north-west of London by railway. The parish church, placed on an eminence, and approached by a flight of steps, is a venerable edifice, dating from the 12th c., and built partly in late Norman, and partly in Perpendicular. The other public buildings comprise churches, chapels, and meeting-houses for the various dissenting sects, and other important institutions. A fine town-hall is (1865) in course of erection. The houses are, for the most part, built of bricks, and roofed with stone. Many improvements in the architectural and sanitary condition of the town have been made within recent years. With all the improvements, however, R. is beautiful only in site, and derives its importance wholly from its extensive and varied manufactures. The woollen manufacture, introduced here by a colony of Flemings in the reign of Edward III., is in a prosperous state, and is increasing in importance. Blankets, baizes, kerseys, and other woollen fabrics are the staple manufactures. Cotton goods also, especially calicoes, are largely manufactured. In the vicinity, coal is found, and flagstones, freestones, and slates are abundantly quarried. A good general trade is carried on; there are several hat-factories, cotton-mills, machine-shops, iron and brass foundries, &c. There are weekly markets for woollen goods and grain, and fortnightly fairs for cattle. The commerce of the town is facilitated by abundant means of communication. Pop. (1861) of municipal borough, 38,114. R. returns one member to the House of Commons.

ROCHEFORT-SUR-MER, an important seaport and naval arsenal of France, in the dep. of Charente-Inférieure, stands on the right bank of the Charente, 5 miles from its mouth. It is surrounded by ramparts, and protected by forts at the mouth of the river; and is a modern, clean, well-built town. Few French towns can be compared with R. for the number and importance of its public works. The harbour, which is one of the three largest in France, is deep enough to float large vessels at low water. R. has fine wharfs, extensive magazines, dock-yards, rope-walks, cannon foundries, and other establishments designed for the manufacture and preservation of naval stores and marine apparatus of every kind, including extensive bread and biscuit stores. The most celebrated of its many institutions are the marine hospital, founded in 1787, and provided with 1240 beds for seamen, besides wards for invalided officers; the artillery and naval schools for every branch of the profession, and the general civil college. Its convict-prison, which had accommodation for 1000 prisoners, has been disused since 1852, and the convicts are now transported to Cayenne. In addition to the extensive trade arising from the special character of the place, R. is the centre of the commerce of the department, and is largely engaged in colonial trade, in the manufacture of brandy, and in the building men-of-war and of merchant-ships, steamers, and coasting-vessels. Pop. (1862) 21,031.

ROCHEFOUCAULD. See LAROCHEFOUCAULD.

ROCHELLE, LA, a fortified seaport of France, capital of the dep. of Charente-Inférieure, on an inlet of the Bay of Biscay, formed by the islands Ré and Oleron, 300 miles south-west of Paris by railway. The inner harbour, which has two basins, in which ships of any size may remain afloat, is surrounded by fine quays and commodious docks, close to which lie the principal streets and squares. Many of the latter are regular and well built, and present a handsome appearance from the number of houses which are adorned with porticoes and balconies. The public buildings most worthy of notice are the arsenal, the palace, the town-hall, the exchange, and the cathedral. Besides the fine promenade of the Place du Château, there are, outside the city walls, two extensive public gardens, known as La Promenade du Mail and the Champs de Mars. Ship-building is actively carried on here, more especially in connection with the Newfoundland fishing-trade; and besides this branch of industry, and the manufacture of cotton yarns, R. has numerous glass-works, sugar-refineries, and distilleries for the preparation of brandy. Pop. (1862) 14,934.—R., which was known till the 12th c. under its Latin name of *Rupella*, or Little Rock, of which its present name is a mere translation, originated in a colony of serfs of Lower Poitou, who, fleeing from the persecution of their lord, settled on the rocky promontory between the ocean and the neighbouring marshes, which had previously been occupied by fishermen only, but which rapidly increased in importance under the new settlers. On the marriage of Eleanor of Aquitaine with Henry II. of England, R., as a part of her dowry, came into the possession of the English kings, by whom it was retained till 1224, when it was taken by the troops of the French king, Louis VIII.; and although it was ceded to England at the treaty of Bretigny in 1360, in the subsequent wars it was retaken by France, under whose sway it has remained since 1372. As a stronghold of the Huguenot party, it underwent various attacks and sieges during the religious wars of the Henries, in the latter half of the 16th c.; and on its final and unconditional surrender to the royal troops in the time of Louis XIII., its old fortifications were destroyed, and new lines of defences subsequently erected by the great Vauban.

ROCHELLE SALT is the popular name of the tartrate of soda and potash ($NaO,KO, C_8H_4O_{10} + 8 Aq$), this salt having been discovered, in 1672, by a Rochelle apothecary named Seignette. It occurs, when pure, in colourless transparent prisms, generally eight-sided; and in taste it resembles common salt. It is prepared by neutralising acid tartrate of potash (formerly known as bitartrate) with carbonate of soda. After a neutral solution has been obtained, it must be boiled and filtered, and the resulting fluid must be concentrated till a pellicle forms on the surface, when it must be set aside to crystallise.

This salt is a mild and efficient laxative, and is less disagreeable to the taste than most of the saline purgatives. From half an ounce to an ounce, dissolved in eight or ten parts of water, forms an average dose. A drachm of Rochelle Salt added to

one of the ingredients of an effervescing draught (bicarbonate of soda or tartaric acid, for example), forms one of the varieties of what are called Seidlitz powders.

RO'CHESTER, an episcopal city, parliamentary and municipal borough, and river-port of Kent, stands between Chatham (q. v.) on the east, and Strood on the north-west, on the right bank of the Medway, 36 miles east-south-east of London, by the London, Chatham, and Dover Railway. Together with Chatham and Strood, it forms in effect one large town. The city is surrounded on two sides by the river; and its ancient castle and cathedral, the numerous martello towers along its shores, and the works connected with the Chatham lines of fortification, render its appearance highly striking. The bishopric of R. was founded in 604; but the early Saxon cathedral suffered from the ravages of the Danes, and was in a completely ruined condition at the time of the Norman Conquest. Gundulf, who was consecrated Bishop of R. in 1077, began to rebuild the cathedral and the priory connected with it; the dormitory, chapter-house, and refectory were added under the succeeding bishop; and the new cathedral was dedicated in 1130, in presence of the king and a great company of bishops. The cathedral, the nave and crypt of which are Norman, and the choir and transepts Early English, is 310 feet long, and the western transept is 123 feet, and the nave and choir 68 feet broad. Of the ancient Norman priory, only a small fragment remains. The castle, crowning an eminence, and overlooking the cathedral, is a Norman keep, built in a wonderfully strong and solid style of masonry. R. carries on little trade, and less manufactures. In 1863, 4357 vessels, of 356,417 tons, entered and cleared the port. R. returns two members to the House of Commons. Pop. (1861) 16,862.

R., which is surmised to have existed prior to the Roman invasion, was called by the Romans *Durobrivæ*, and, according to Bede, derives its present name (*Hrofs-ceaster*, Hrof's Castle) from that of Hrof, a Saxon chieftain.

ROCHESTER, a city of New York, U.S., is on the Genesee River, 7 miles south of its entrance into Lake Ontario, where it is crossed by the Erie Canal and the Central Railway, and is the terminus of the Genesee Valley Canal and Railway, 229 miles west-north-west of Albany. In the centre of the city are the upper falls of the Genesee, a perpendicular cataract of 96 feet. Two other falls of 84 and 25 feet are a mile and a half below, the river running through a deep gorge in its limestone banks, from 100 to 220 feet high. The city is well built, chiefly of bluish limestone, with broad shaded streets, and there are nearly as many houses as families. The falls give water-power to numerous large flour-mills and other manufactories. The canal crosses the river on a handsome aqueduct of seven arches. There are 46 churches, 43 schools, a university, theological seminary, athenæum, Protestant and Catholic hospitals, a reformatory, and county offices, 9 banks, 3 daily and 4 weekly papers. In 1860, the county penitentiary yielded 3000 dollars over expenses. The rural cemetery of Mount Hope is one of the ornaments of the city. The suburbs are highly cultivated, having 4000 acres of fruit-trees, and nurseries of 250 to 500 acres. Twenty-four flour-mills, with 125 runs of stones, make 800,000 barrels of flour a year. There is a good harbour at the mouth of the river, and a considerable commerce by the lake. R. was settled in 1810; in 1820, its population was 1502; in 1840, 20,191; in 1860, 48,243.

ROCHESTER, John Wilmot, second Earl of, has left a name notorious for wit and profligacy. He was born April 10, 1647, at Ditchley, Oxfordshire, his father being Henry, first earl, better known as the Lord Wilmot of Clarendon's *History*. He was entered of Wadham College, Oxford, when only 12 years of age; and at 14 was, with other persons of rank, made M.A. by Lord Clarendon in person. After travelling in France and Italy, he attached himself to the court, and rose high in favour with Charles II., who made him one of the gentlemen of the bedchamber, and comptroller of Woodstock Park. In 1665, he went to sea in the fleet commanded by the Earl of Sandwich, and behaved at Bergen with great intrepidity. His account of the attack is described in a letter to his mother given in Wordsworth's *Ecclesiastical Biography*. He had entered into a formal engagement with his friend Mr Windham, 'not without the ceremonies of religion, that if either of them died, he should appear, and give the other notice of the future state, if there was any.' Windham was killed in the action, but did not afterwards disturb the repose of his friend. R. incurred the displeasure of the king, and was committed to the Tower, for the forcible abduction of a celebrated beauty and heiress, Miss Mallett, who was rescued by her friends, but whom he subsequently married before he was 20 years old. His wit and love of pleasure made him the favourite of a dissolute court. He once harangued the populace as a mountebank from a stage on Tower Hill, and is said to have occasionally persuaded the 'merry monarch' to disguise his rank, and accompany him in the pursuit of frolic and adventure. His genius and activity of mind led him to withdraw at times from scenes of gallantry and licentious merriment. He cultivated the Muses with success, and Anthony Wood speaks of him as the greatest scholar among the nobility of his day. As he grew older, he gave less of his time to study, and more to the company of vicious companions, and indulgence in wine. His constitution being undermined by excess and voluptuousness, he died at the early age of 34. Bishop Burnet has left an interesting account of his death under the title of *Some Passages of the Life and Death of John Earl of Rochester*, from which it appears that he became a sincere convert to the truth of Christianity, and sincerely repented his immoral and dissolute courses. He wrote some love-songs, an elegant *Imitation of Horace on Lucilius*, a *Satire against Man*, in which he is much indebted to Boileau, and an *Essay on Nothing*, which is perhaps his best performance.

RO'CHET (Lat. *rochetus*, or *rochettus*), a portion of the church costume of bishops, abbots, prelates, canons of certain privileged chapters, and some other dignitaries. It is usually of lawn or lace, and is of the form of a surplice, but with close-fitting sleeves. In the Latin Church, its use is very ancient, although its form has varied at different times. In the first Prayer-book of Edward VI., which preserved a considerable part of the Roman episcopal costume, the rochet was ordered to be worn by bishops in the communion service. The rochet, however, must not be confounded, as is often done by writers on clerical costume, with the Dalmatic and Tunic, tight and close-fitting vestments of coloured silk, worn by bishops under the *Planeta* (q. v.).

ROCK. Though popularly restricted to masses of indurated matter, this term is extended by geologists to all substances which make up the crust of the earth, whether they be loose and friable like soil and sand, or compact and indurated like limestone and granite. The rocks of the earth's crust will be found described under the heads

Aqueous and Igneous Rocks, to which the reader is referred.

ROCK, a kind of sweetmeat, made of sugar, sometimes mixed with almonds and various flavouring materials. The sugar is first boiled, and then poured out upon a cold marble slab, and worked up into a rough mass.—The term is also frequently applied to another form of sweetmeat, in which the sugar, whilst hot and soft, is pulled repeatedly over a smooth iron hook, until it becomes white and porous. This is also flavoured with peppermint or other essences.

ROCK, Cock of the (*Rupicola aurantia*), a bird of the order *Insessores*, tribe *Dentirostres*; family *Pipridæ* (Manakins, &c.), regarded by many as a sub-family of *Ampelidæ*. The *Pipridæ*, or Manakins, are a pretty large group of birds, many of them of very curious and beautiful plumage, most of them inhabitants of America, and only of the tropical parts of it. They have the bill broad at the base, the nostrils at the side nearly hidden by feathers; the wings rather short, but pointed; the tail very short and even; the legs (*tarsi*) long and slender. In the genus *Rupicola*, the bill is strong; and the species sometimes called *Rock-manakins* are comparatively large birds, having a double vertical



Cock of the Rock (*Rupicola aurantia*).

crest on the head, with the feathers disposed in a fan-like manner. The Cock of the R. is a native of Guiana and of other north-eastern parts of South America. It is remarkable for its bright orange-coloured plumage—the quill-feathers of the wings, however, being black, and the tail tipped with yellow—its large crest overhanging the bill, and its wary habits. It is a solitary bird, inhabiting rocky places, retiring into a hiding-place during the day, and coming forth to feed at sunrise and sunset. The tips of the crest-feathers are tinged with brown and yellow. The wing-coverts and upper tail-coverts are loose flowing plumes, giving a resemblance to gallinaceous birds. The size is about that of a common pigeon.—The Peruvian Cock of the R. (*R. Peruviana*) is less brilliant in plumage than the Guiana species.

RO'CKALL stands on a sandbank in the North Atlantic Ocean; this bank is nearly 100 miles in length, and 40 in breadth. The rock itself is situate in 57° 35′ N. lat., 13° 40′ W. long., about 300 miles west of North Uist, in the Outer Hebrides, and is of a rounded form, rising about 18 or 20 feet above the sea. It is frequented by large flocks of sea-birds, and the place was found a few years ago to be surrounded by considerable shoals of the larger kinds of fish, chiefly *Gadidæ* and *Pluronectidæ*. A company was formed in 1861 to carry on a fishery at the place; but the supply not proving so great as was anticipated, and the distance from the markets being very considerable, the speculation proved to be very unprofitable. There are still a few fish about R., but they are caught by private fishermen.

ROCK BUTTER, a mineral substance, consisting of Alum (q. v.), mixed with alumina and oxide of iron, of a pasty consistency, and appearing as an exudation oozing out of rocks which contain alum. It is always greasy to the touch, but is often hard enough to exhibit a straight foliated fracture. It is very easily broken. It occurs in most of the places where alum is procured.

ROCK CRYSTAL, a popular and partly also a scientific name for the finest and purest Quartz (q. v.), seldom applied, however, to small crystals which are mere six-sided pyramids, but more generally to those in which the six-sided prism is well developed. The name is sometimes limited to colourless and perfectly transparent quartz, but is also more rarely extended to that which is violet or amethystine (*Amethyst*, q. v.), red (*Bohemian Ruby* or *Silesian Ruby*), wine-yellow (*Citrin* or *Gold Topaz*), brown or smoky (*Smoke Quartz, Cairngorm Stone*), &c. The beauty of specimens of R. C. is sometimes very great. The crystals are sometimes slender, crossing and penetrating each other in exquisite groups. They sometimes enclose other substances, which are beautifully seen through the transparent R. C., as slender hair-like or needle-like crystals of hornblende, asbestos, oxide of iron, rutile or oxide of titanium, oxide of manganese, &c., and such specimens are known by various fanciful names, as *Thetis's Hair-stone, Venus's Hair-stone, Venus's Pencils, Cupid's Net, Cupid's Arrows*, &c.; and sometimes the enclosed substances are small spangles of iron-glance, or crystals of iron pyrites, or native silver in fern-like leaves, or spangles of gold. Very large crystals of perfectly pure R. C. are sometimes found. One found in the Alps, and which was among the treasures carried from Italy by the French in 1797, is 3 feet in diameter, and weighs 8 cwt. R. C. was prized by the ancients, and was used by them, as it still is, for vases, cups, seals, &c. An important modern use of it is for lenses of spectacles, &c., its hardness rendering it much less liable to be scratched than glass. Lenses of R. C. are often called *Pebble* lenses.

RO'CKET, a name given to a number of plants of the natural order *Cruciferæ*, and belonging to the genera *Brassica, Sisymbrium, Erysimum, Barbarea, Hesperis*, &c.—Garden R. (*Brassica Eruca*, or *Eruca sativa*) is an annual plant, a native of Austria, with stem two feet high, upright and branching; the leaves smooth, succulent, cut and toothed. When in flower, it has a strong, peculiar, and disagreeable smell; but when it is very young, this smell is almost imperceptible, and the leaves are used as a salad, for which it is frequently sown on the continent of Europe, and was formerly cultivated also in Britain.—The name Garden R. is also given to *Hesperis matronalis*, also called Dame's Violet (q. v.), a favourite ornament of our flower-borders.—The Yellow R. of our flower-borders is a double-flowered variety of *Barbarea vulgaris* (see Cress).—The Wild R. (*Sisymbrium officinale*, or *Erysimum officinale*) is common in Britain, and is sometimes sown and used as a spring pot-herb.

ROCKET is a firearm capable of taking effect at a long range. The rocket consists of a light

tubular case of pasteboard, or thin metal, charged to the muzzle with a composition consisting of saltpetre 68 parts, sulphur 12 parts, charcoal, or mealed powder, 32 parts. This composition is rammed hard into the case, the centre being left void. To the rocket is attached a long stick, which serves (like the tail of a kite) to straighten its course. See PYROTECHNY. When lighted at the end the stream of gases propels the mass on the principle explained under BARKER'S MILL. As a mere firework, rockets are made of a few ounces in weight: as intended to throw light upon a town or a hostile work, they average from ½ lb. to 2 lb. These light rockets were improved by Sir William Congreve, who so contrived them, that, when over the necessary point, the rocket discharged a number of light balls, which burned in the air for several minutes with great brilliancy, while others at the same point released small parachutes, which sustained a bright light for a still longer time. But Sir William Congreve did more: he converted the rocket into a terrible weapon of war, with ranges which no ordnance of that day could attain. Discarding the small sizes, he made 12-lb., 18-lb., and 32-lb. rockets, which he charged with canister-shot, bullets, and other missiles. The stick for a 32-lb. rocket is 18 feet in length, and the maximum range 3500 yards. The range can be also increased by discharging the rocket from a cannon, with a time-fuse to ignite it at the cannon's utmost range, when the rocket commences its own course. As missiles, these rockets are found to annoy most seriously the defenders in any fortified work, and, in a bombardment, they speedily set houses and buildings on fire. In the field, also, the plunging, ricochetting motion of the rocket greatly disturbs both cavalry and infantry. The Congreve rockets were first tried on actual service, and with fatal effect, at the attack on Copenhagen in 1807.

Congreve Rocket.

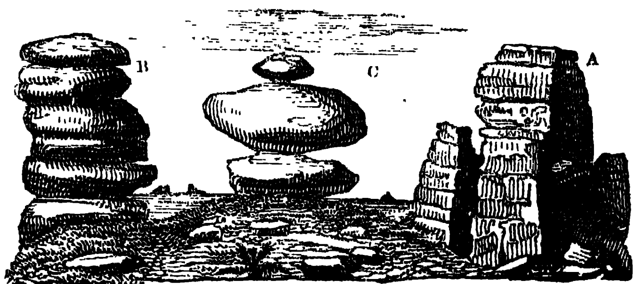
One great advantage in a rocket is, that it has no recoil against the stand from which it is fired; the largest rocket may therefore be discharged without danger from the smallest boat; consequently, in naval attacks on maritime fortresses, a flotilla of rocket-boats is a very common auxiliary.

ROCK-FISH. See WRASSE.

RO'CKFORD, a city of Illinois, U.S., on the east bank of Rock River, 92 miles west-north-west of Chicago, on the Chicago and Galena Railway. It is the centre of a rich country, with county buildings, 1 bank, 2 newspapers, 5 churches, and factories supplied with water-power by the rapids of the river. Pop. in 1860, 7363.

ROCKING-STONES, or LOGGANS, are large masses of rock so finely poised as to move backwards and forwards with the slightest impulse. They occur in nearly every country. Some of them appear to be natural, others artificial; the latter seem to have been formed by cutting away a mass of rock round the centre-point of its base. The former are chiefly granitic rocks, in which felspar and porphyry are abundantly present; and these ingredients becoming rapidly decomposed, and the dust and sand washed away by rains, what was formerly a solid rock soon assumes the appearance of a group of irregularly-shaped pillars, having a rhomboidal horizontal section, and separated into portions by horizontal and vertical fissures. As decay proceeds, the edges of the blocks forming the pillar are first attacked and disappear, as is also the case with greenstone and basalt, and the pillar now becomes a pile of two or more spheroidal rocks, resting one upon the other (see fig., where A, B, and C exhibit three successive stages in the process of decomposition, as observed by De Luc in the mountains of Silesia). Should a mass of rock be so situated as to preserve its equilibrium in spite of the gradual diminution of its base or point of support, a rocking-stone or loggan is the result. For an exposition of the principle regulating the stability of equilibrium of rocking-stones, see STABILITY. Various explanations have been given of the uses of these singular objects. They are supposed to have been used in very early times for purposes of divination, the number of vibrations determining the oracle; hence it came to be believed that sanctity was acquired by walking round them.

Some rocking-stones occur near to remains of ancient fortifications, which seems to bear out a statement in one of the poems of Ossian, that the bards walked round the stone singing, and made it move as an oracle of the fate of battle. In Greece, rocking-stones occur as funeral monuments, and are generally found on conspicuous places near the sea. Rocking-stones are numerous in Yorkshire, Derbyshire, Cornwall, and Wales. One near Land's End, in Cornwall, has been computed to weigh no less than 90 tons. Near Warton Crag, Lancashire, are no less than seven of these stones. In Scotland,



Rocking Stone.

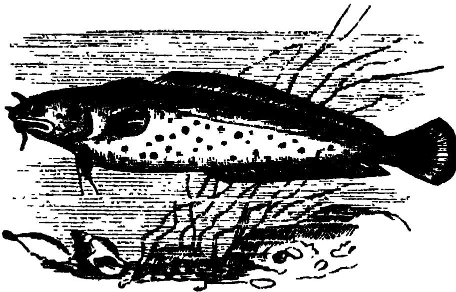
they occur in the parishes of Kirkmichael, Dron, and Abernethy, Perthshire, and in the parish of Kells, Kirkcudbrightshire. In Ireland, they are found in many places; one situated on the eastern part of Brown's Bay, Island of Magee, is popularly believed to acquire a rocking tremulous motion at the approach of sinners and malefactors.

ROCK ISLAND, a city of Illinois, at the foot of the upper rapids on the Mississippi, opposite Davenport, Iowa, 3 miles above the mouth of Rock River, 181 miles west-by-south of Chicago. The Mississippi is here crossed by a railway bridge, and the island from which the town is named has been selected as the site of a national armoury. A dam across a portion of the river gives water-power for numerous manufactories. Pop. in 1860, 5130.

RO'CKLAND LAKE, a beautiful sheet of water in Rockland County, New York, U.S., 30 miles north of New York City, 1 mile from the Hudson, and 160 feet above its surface. It is celebrated for furnishing 200,000 tons of pure ice, annually harvested by about 1000 men, for the supply of New York, and for export.

ROCKLAND, a town in Maine, U.S., on the west side of Penobscot Bay, 40 miles south-east of Augusta. It has a broad and deep harbour, and 64 lime-kilns, making 5000 casks of lime a day, chiefly shipped to Boston and New York. Its commerce employs 18 ships, 40 barks and brigs, and 150 schooners. It has 3 banks, 2 newspapers, 8 churches, &c. Pop. in 1860, 7316.

RO'CKLING (*Motella*), a genus of fishes of the Cod and Haddock family (*Gadidæ*), having an elongated body, compressed towards the tail; the first dorsal fin very slightly elevated, and very delicate; the second dorsal and the anal fins long, continued almost to the tail fin. Several species are found on the British coasts, and are distinguished among other things by the number of their



Three-bearded Rockling or Sea Loach (*Motella tricirrata*).

barbules, three, four, or five. The largest of them is never more than 19 or 20 inches long; the smallest, the MACKAREL MIDGE (*M. glauca*), only about an inch and a quarter. None of the species is much regarded by fishermen, one reason being, that decomposition takes place very rapidly after they are taken out of the water, although, when quite fresh, they are not bad for the table.

ROCK-OIL. See NAPHTHA.

ROCK RIVER rises in the south-eastern portion of Wisconsin, U.S., and runs south-west into Illinois, thence south-west, and empties itself into the Mississippi 3 miles below Rock Island. Its course of 200 miles is through one of the most beautiful and fertile regions in the world, known as the 'Rock River Country.' Its frequent falls give abundant water-power, and it is crossed by 12 lines of railway.

ROCK-ROSE. See CISTUS.

ROCK-SALT is common salt (chloride of sodium) occurring as a mineral and in a solid form. It is always mixed with various impurities. It is found massive or crystallised, its crystals generally cubes, its masses very often either granular or fibrous. It is white, gray, or, owing to the presence of impurities, more rarely red, violet, blue, or striped. For its chemical and other qualities, see SALT. It is a very extensively-diffused mineral, and in some places forms great rock and even mountain masses. A hill of rock-salt near Montserrat, in Spain, is 500 feet high. The island of Ormuz, in the Persian Gulf, is formed of rock-salt. The Indus, in the upper part of its course, forces its way through hills of rock-salt, rising in cliffs 100 feet above the river. In many parts of the world, rock-salt is found in beds under the soil or other rocks. Those of Cheshire in England are particularly celebrated, as at present yielding almost all the salt used in Britain, great part of which is pumped from them in the form of brine. Part is also obtained by mining, as at Northwich. The mines of Wieliczka, in Poland, are of great extent. The workings are at depths varying from 200 to 740 feet, and the salt at the deepest working is the purest. Some of the chambers in the mines are said to be 300 feet high. Blasting by gunpowder is often necessary in the mining operations. The mines give employment to 1200 or 1400 workmen; and they have been wrought for centuries. Vast quantities of rock-salt occur in many parts of Asia, Africa, and America. In Caramania and Arabia, rock-salt is sometimes used for building houses, the dryness of the climate rendering its solubility unimportant.—The salt which crystallises on the margins and bottoms of salt lakes may be regarded as a variety of rock-salt. Concerning the salt of the ocean, the salt found in many desert regions as an efflorescence on the ground or on rocks, the salt with which sandstone and other rocks are impregnated, &c., see SALT.

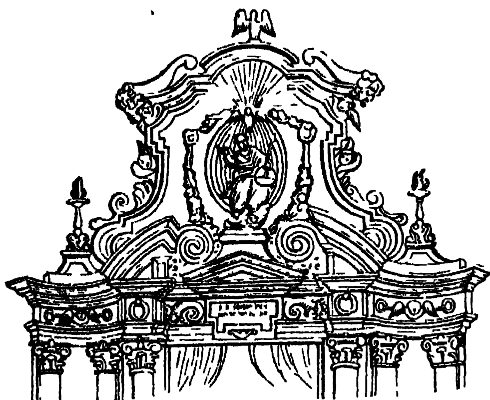
ROCK-SOAP, a mineral consisting of silica, alumina, peroxide of iron, and water, the silica nearly one-half, the alumina and the water sometimes nearly each one-fourth of the whole. It is earthy, easily broken, black or nearly so, very soft, and easily cut with a knife, is greasy to the touch, and adheres strongly to the tongue. It is valued by painters for crayons. It is found in a number of places on the continent of Europe, and occurs in trap rocks in the Isle of Skye. It is only found massive.

ROCK-WORK, an ornamental structure often introduced into gardens, for the cultivation of plants such as grow on or amongst rocks. It is made of rough blocks of stone rudely piled together, with earth, &c. Simple as it seems, it is very difficult of construction; and too often, after much expense, it has a paltry and ridiculous appearance.

ROCKY MOUNTAINS, that portion of the great ranges of mountains in the central and western portions of North America which lies in the United States and British possessions, a continuation of the Cordilleras of Mexico, between the Pacific Ocean and 105° W. long., and reaching from Mexico to the Arctic Ocean. In the United States, the R. M. extend over a breadth of 1000 miles, and cover an area of 980,000 square miles. From lat. 32° to 40° N., the ranges bear nearly north and south; between lat. 40° and 45° N., their course is north-west; then, after a more northerly bend, they keep a course nearly parallel to that of the Pacific, with many detached ranges and peaks, one of which, Mount Elias, lat. 61° N., long. 141° W., is 17,800 feet high, and marks the boundary-line of longitude between the Russian and British possessions. Mount Chasta, in the coast-range in North California, is 14,000 feet high; Fremont's Peak, on the eastern boundary of Oregon, and the sources of the Yellowstone and Colorado Rivers, is 13,570 feet. In British Columbia, Mount Brown, lat. 53°, is 16,000 feet; and Mount Hooker, 15,700 feet. The passes have elevations of 6000 to 7000 feet, and a vast territory is from 4000 to 5000 feet above the level of the sea. The central range of the R. M. forms the ridge which divides the rivers that fall into the Pacific from those that fall into the Arctic Ocean, Hudson's Bay, and the Gulf of Mexico, and whose head-waters are often interlocked; but between the eastern and western ranges lie the great territories of Utah and

Nevada, in which are large rivers having no other outlets than lakes, generally salt, as Great Salt Lake in Utah, and Humboldt's Lake, the outlet of Humboldt's River, in Nevada. The tops of the higher ranges are covered with perpetual snow, and their lower regions abound with artemesias, odoriferous plants, and sunflowers. The rocks are metamorphic gneiss, granites, porphyries, mica and talcose slates, and gold-bearing quartz, with deposits of mercury, silver, carboniferous lime stone, coal, and petroleum. Anthracite has been found near the gold mines of Santa Fe, and copper in New Mexico.

ROCO'CO, a name given to the very debased style of architecture and decoration which succeeded the first revival of Italian architecture. It is ornamental design run mad, without principle or taste. This style prevailed in Germany and



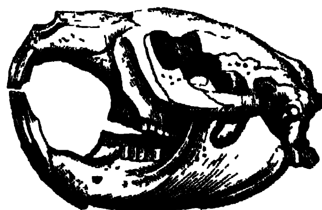
Rococo Ornament.

Belgium during last century, and in France during the time of Henry IV. The fig. is an example from an altar in the church of St James's, Antwerp.

ROCROI, a small town of France, in the dep. of Ardennes, 15 miles north-west of Mézières, is a fortress of the fourth class, and is situated in a fine, extensive plain, bounded on all sides by the forest of Ardennes. Pop. (1862) 1029. It is memorable for the victory gained by the Great Condé (then Duke of Enghien) over the Spaniards, May 19, 1643. The Spanish army was composed of veteran bands of Walloons, Spaniards, and Italians; and their general, Don Francisco de Mellos, the governor of the Low Countries, was a commander worthy of his army. The French (22,000) were also good troops; but their general, Condé, was a young and inexperienced officer. At first, the battle was unfavourable to the French, but at last the Spaniards were thrown into irretrievable rout. The Count of Fuentes, the commander of the redoubtable infantry, and 10,000 of his men, were among the slain; and 5000 men, with all the cannon, many standards, and the baton of the Count de Mellos, were captured. But, far beyond all material losses, the renown of invincibility, first acquired by the Spanish infantry on the field of Pavia (1525), and confirmed at St Quentin, Gravelines, and Prague, was destroyed.

ROD, called also a *pole*, or *linear perch*, a measure of length of 5½ yards, or 16½ feet. The square rod, called generally a *rood*, is employed in estimating masonry, and contains 16½ × 16½, or 272¼ square feet.

RODE'NTIA (Lat. Gnawers), or RODENTS, in the system of Cuvier, an order of mammalia, almost exactly corresponding with the *Glires* of Linnæus. The order is a truly natural one, and is therefore universally recognised by naturalists. The R. are small quadrupeds; the largest of them—the Capybara—not being equal in size to a hog, whilst to this order belong the smallest of mammalia. They are very numerous, and widely distributed over the globe, particularly abundant in South America, and rarest in Australia. They are all remarkably characterised by their front teeth, variously regarded as incisors and canines—the true incisors or canines being absent—which are large and of peculiar structure, two in each jaw, and separated by a considerable vacant interval from the molars. The front teeth have a plate of hard enamel in front, which wears more slowly than the substance of the rest of the tooth, so that being employed on hard substances, they acquire a chisel-like form, and unlike the teeth of mammals in general, they are always growing from a fresh pulp at the base, so that compensation is made for the wearing away at the tips; but when a tooth is accidentally destroyed, the opposite tooth continuing to grow, sometimes acquires a monstrous shape and size, from which cause rats and other rodents have been known to die, the enormous tooth preventing the eating of food, or even recurving and piercing the skull. The ordinary food of most rodents consists of vegetable substances, and generally of a pretty hard kind, and their front teeth are adapted for comminuting it by gnawing, and are also used for gnawing wood, the shells of nuts, &c., in order to obtain access to food. The molar teeth have flat crowns, having ridges of enamel, which make them more or less tuberculous; and these are in the line of the jaw, whilst the only horizontal motion of which the lower jaw is capable is forwards and backwards, thus making the ridges of the molar teeth powerful instruments for the reduction of hard substances; the jaws also being in general very strong. In the rodents which eat only vegetable food, the molar teeth have rounded tubercles; whilst in the omnivorous kind—as rats—the tubercles become sharp points. The stomach is simple; the intestines are very long; the cæcum is often large, sometimes larger than the stomach itself. The brain is not large, and is nearly smooth, and without convolutions; the rodents are not generally distinguished for sagacity, although some



Skull of the Beaver, shewing the Dentition.

of them—as the beaver—exhibit remarkable instincts. Most of them may be easily tamed, but few of them seem capable of learning anything, and in general they merely acquire a familiarity with man. Of this the rabbit exhibits a very perfect example, although the rat seems to display a far higher intelligence. The eyes are directed laterally. The rodents very generally have the hinder limbs larger than the fore, and their motion is partly a kind of leaping. In some, this is as completely the case as in kangaroos. Some, as squirrels, have an admirable power of climbing trees; and a few, as beavers and water-voles, are aquatic. Most, if not all, have the habit of sitting

on their haunches, and holding their food to their mouth by their fore-paws; using both paws together, however, as the fore-feet have not at all the character of a hand. The thumb is never opposable to the other toes; sometimes it is rudimentary or wanting. The bones of the fore-leg are generally separate, but have not so much freedom of motion as in the *Carnivora*. The toes are terminated by claws. The presence or absence of clavicles (collar-bones) divides the order into two sections, to the first of which, having clavicles, belong squirrels, mice, rats, voles, the beaver, &c.; and to the second, without clavicles, belong porcupines, cavies, chinchillas, hares, rabbits, &c. The rodents are very numerous, about 400 species being known.

RODERIC, the last king of the Visigoths in Spain, whose tragic downfall, coincident with that of the Visigothic monarchy, has inspired poets and romancers (including historians) to throw round him a halo of glory. The Spanish and Arab historians contradict each other in almost every particular of R.'s life—the latter, on the whole, being apparently the more trustworthy. According to them, R. was of humble birth, but rose, through his talent and bravery, to the command of the cavalry. A conspiracy having been formed against Witiza, the reigning monarch, by the clergy and the nobles of Roman blood, R. was elevated to the throne in 709, and by his energy and talent soon quelled all opposition. The sons of Witiza, however, joined with some malcontent Visigothic nobles—among whom was Count Julian—and agreed to summon to their assistance the Arab chief, Muza ibn Nozeir, who had just finished the conquest of Mauritania. The Spanish writers, on the other hand, assert that the country groaned under the tyrannical government of R., that his licentious behaviour had disgusted many of his nobles, and that the people were ripe for a revolution when the Moslem invasion took place. Both are agreed as to the time and mode of the invasion; but the Arab historians brand Count Julian with the most atrocious treachery, as not only voluntarily surrendering Ceuta, the key of the country, but actually guiding the 13,000 Berbers and Arabs under Tarik into Spain. A landing was effected at Algesiras, 28th April 711; and in spite of vigorous opposition from the governor of Andalusia, Tarik marched on, routing R.'s chosen cavalry, which had been sent to oppose him. R., who had been employed in another quarter, now hastened at the head of an army, which is variously estimated at from 50,000 to 100,000 men, to oppose the daring invaders, who by this time had been so reinforced from Africa and by rebels that their numbers amounted to 25,000. The two armies met on the banks of the Guadalete, near Xeres de la Frontera, and on July 17 the battle commenced. R. directed the centre of his army in person, appointing the sons of Witiza to command the wings, and the battle raged furiously for three days; a single combat then took place between R. and Tarik—a kind of statement extremely frequent in eastern histories—in which the former was slain, and his head cut off, to be embalmed and sent to Muza. The Christians, enraged at the loss of their chief, fought furiously during six days longer, but all in vain, for victory now declared itself decisively in favour of the Moslems, to whom the sons of Witiza had deserted soon after the commencement of the contest, and the rout of R.'s army was complete. The most ancient Spanish chroniclers agree in asserting that R. either died on the field or sunk in the Guadalete, whilst attempting to save himself by swimming his horse across; and the various stories of his escape and subsequent adventures are of much later date. This decisive victory laid all Central and Southern Spain at the feet of the Arabs. R. has been made the hero of an epic poem by Southey.

RODEZ, a small town of France, capital of the dep. of Aveyron, stands on the crest and slope of a hill, on the north bank of the Aveyron. Its streets are steep, narrow, winding, and dirty; but the promenades around the town are pleasant. The cathedral, with a clock-tower of great height, is a Gothic structure of the 15th century. A variety of woollen cloths are manufactured, and cheese of a highly esteemed quality is made. Pop. (1862) 9200.

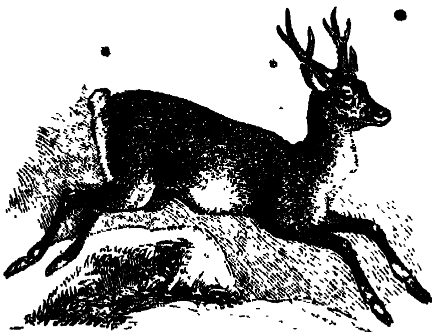
RODIYAS, a degraded race in Ceylon, who are expelled from society, and live in a condition more abject than that of the Pariahs of India. By some they are thought to be a branch of the Veddahs (q. v.). Under British rule, which does not recognise caste, the R. have improved socially, and are no longer disqualified for labour. For many interesting particulars respecting this unfortunate race, see *Ceylon*, by Sir J. E. Tennent, vol. ii. p. 191.

RODNEY, GEORGE BRYDGES RODNEY, LORD, English admiral, born February 13, 1718, was second son of Captain Rodney of the Royal Marines. He was taken from Harrow School at the early age of twelve, and sent to sea. He became lieutenant in 1739; post-captain, 1742; and commander of the Newfoundland station in 1748, with the rank of commodore. In 1752, he returned home, and was elected M.P. for Saltash. He afterwards commanded the *Fougueur*, the *Prince George*, and the *Dublin* men-of-war. In 1759, after 28 years' active service, he was made rear-admiral; and in July he bombarded Havre for two or three days, destroying the town and fortifications so effectually, that it has never recovered its former importance as an arsenal for ships-of-war. In 1761, he took Martinique, Grenada, and Santa Lucia. In 1762, he became vice-admiral, and in 1764 was made a baronet. In 1779, Spain joined France in the war against England, and their united fleets appeared in the Channel in overwhelming force. The siege of Gibraltar was undertaken by the Spaniards; and R., who was sent out with 22 sail of the line and 8 frigates to the West Indian station, was ordered to relieve Gibraltar *en route*. After capturing seven Spanish ships of war, he fell in, January 16, 1780, with Admiral Langara, off Cape St Vincent, 'that promontory which has witnessed more of our battles and triumphs than any other headland in the world.' Of the Spanish fleet, five were captured, and two destroyed. Having accomplished the relief of Gibraltar and Minorca, he quitted the Mediterranean, and crossed the Atlantic to the station of his command. On the 17th April he defeated, near Martinique, the French fleet, under the Count de Guichen. Being ill-supported by his captains on this occasion, he complained to the Admiralty. The naval administration of the day was, however, so corrupt and rotten, that the Admiralty suppressed the criminatory passages of his dispatches, and only one of the accused was brought to trial, the others being allowed to escape from the difficulty of finding a sufficient number of non-delinquent officers to try them. R. took Eustatia from the Dutch, with 250 ships and other booty, estimated at three millions sterling. Demerara and Essequibo next surrendered. On the 12th April 1782, R., in conjunction with Hood and Drake, encountered the French fleet under De Grasse off Dominica, April 12, 1782. Each fleet consisted of upwards of 30 ships of the line. The battle was more obstinately contested than any engagement that ever took place between the two nations, being kept up without intermission for nearly 12 hours. De Grasse was totally defeated, and R. lost

seven ships of the line and two frigates. Owing to the French vessels being crowded with troops, they are said to have lost 3000 killed and 6000 wounded; while the English loss did not exceed 600. On board the *Ville de Paris* were 36 chests of money, to pay the soldiers; and the whole train of artillery was on board the other captured ships. Count de Grasse was himself taken prisoner. His flag-ship, the *Ville de Paris*, of 112 guns, was the only first-rate man-of-war that, up to that date, had ever been taken and carried into port; and De Grasse, when he landed at Portsmouth, was stated to be the first commander-in-chief of a French fleet or army who had been prisoner in England since the capture of Marshal Tallard in Queen Anne's wars. In this action, R. successfully executed the nautical manœuvre of breaking the French line, and placing the enemy between two fires, which had fallen into disuse since the Commonwealth. R.'s victory saved Jamaica, ruined the naval power of France and Spain, and gave the finishing blow to the war. The news arrived in England just after an order had been despatched for the recall of R., whose politics differed from those of the new ministry. He was now elevated to the peerage as Baron Rodney, and received a pension of £2000 per annum for himself and his successors. He lived in retirement for the rest of his life. He died May 21, 1792, leaving behind him the fame of one of the most distinguished commanders in the naval annals of Great Britain. A monument was erected to his memory in St Paul's Cathedral; and his portrait, by Sir Joshua Reynolds, is among the treasures of Greenwich Hospital.

RODOSTO, a town of European Turkey, in the eyalet of Adrianople, stands on the north shore of the Sea of Marmora, 77 miles west of Constantinople. It is surrounded by beautiful gardens, contains many mosques, and sends large quantities of fruits and vegetables to the capital of the empire. Pop. 18,000.

ROE (*Cervus capreolus*, or *Capreolus dorcas*), a species of Deer (q. v.), inhabiting Europe and some parts of Asia, chiefly in hilly or mountainous regions, either covered with forests or with scattered bushes and heath. It is seldom found in the higher and



Roebuck (*Cervus capreolus*).

more naked mountain tracts, the haunt of the stag or red deer. It was once plentiful in Wales and in the hilly parts of England, as well as in the south of Scotland, but is scarcely now to be seen in any part of Britain south of Perthshire. It is not long since it was pretty common in some of the wilder parts of the north of England. The R. is about 2 feet 3 inches in height at the shoulder. Its weight is about 50 or 60 pounds. Its colour is a shining tawny-brown in summer, more dull and grizzled in winter, the lower parts and part around the tail white. There is considerable variety in the shade of colour. The hair is longer than in many deer. The tail is very short, concealed among the hair. The horns, which are peculiar to the male (the *Roebuck*), are 8 or 9 inches long, erect, round, very rough, longitudinally furrowed; having, in mature animals, two tines or branches, which, as well as the tip of the horn, are sharp-pointed, so that the horns of the R. become very dangerous weapons when used for offence. The ears are large. The habits of the R. somewhat approach to those of the goat, or even of the chamois. It keeps its footing on rocks with great security, bounds very actively, and takes great leaps. Its usual pace, when not very hard pressed, is, however, a kind of canter. It is not gregarious, not more than a buck and doe with one or two fawns being usually seen together. Contrary to what is usual among deer, the male and female R. remain attached during life. The voice of the R., resembling that of a sheep, but shorter and more barking, is often heard through the night, in regions where it is plentiful. The browsing of the R. is very injurious to young woods, a circumstance which has led to its extirpation in places where it would otherwise have been cherished. It feeds much on the tender shoots of trees and bushes as well as on herbage. The venison is superior to that of the stag, but not equal to that of the fallow-deer. The horns are used for handles of carving-knives, &c. The R. is never very thoroughly tamed, and when partially so, is apt to become mischievous, and the male dangerous.—Another species of R. (*Cervus* or *Capreolus pygargus*), rather larger than the common R., is found in Tartary.

ROEBUCK, John Arthur, English politician, was born at Madras in 1801, but passed his youth in Canada. At the age of 23, he came to England, and was called to the bar at the Inner Temple in 1831. He challenged the suffrages of the electors of Bath as a Radical reformer in 1832, and represented that city until 1837. He was again elected in 1841, and held his seat until the general election (1847). In May 1849, he was returned for Sheffield, which, up to the present date (1865), he has continued to represent. In 1835, when the executive government of Canada and the House of Assembly of Lower Canada were at variance, the latter body appointed R. their paid agent in England—a position which involved him in a serious quarrel with the press. He was next the central figure of a parliamentary 'scene,' on the occasion of a too plentiful crop of election petitions and election compromises subsequent upon a general election. He made out such a case that, in defiance alike of Whigs and Tories, he obtained a committee to inquire into election compromises. His next great appearance was at the meeting of parliament in January 1855, when he gave notice of a motion for inquiring into the condition of the army before Sebastopol. To the undisguised joy of the nation, R. carried his motion by an immense majority, and the administration of the Earl of Aberdeen was shattered to pieces. The Sebastopol Committee sat, and the inquiry exercised great influence in the subsequent reconstruction of the War Department, and the reorganisation of our military, commissariat, and medical systems. In 1855, he became a candidate for the chairmanship of the Metropolitan Board of Works, with a salary of £1500 per annum, but was only third on the poll. On the annexation of Savoy and Nice in 1860, R. indulged in the sharpest invective against the Emperor Napoleon. He became a director of the Galway Steam-packet Company, and offended his constituents by defending a contract which they regarded as savouring of a political job. He went

to Vienna to obtain some commercial concessions for a company with which he was connected, and returned with strong pro-Austrian sympathies, volunteering a defence of Austrian rule in Venetia, which jarred upon public feeling.* During the civil war in America, he displayed a strong leaning towards the cause of the Confederates. In the debate on the war between Germany and Denmark, R. declared (1864) that the English fleet ought to have been sent to defend Denmark. R. is fearless and unmeasured in attack, not too charitable in his judgments, fond of personalities, sending his taunts home by the frequent use of the upraised arm and the pointed index finger; but is regarded nevertheless as in the main an honest and true-hearted Englishman. He is the author of a work on the *Colonies of England*, the *History of the Whig Ministry of 1830 to the passing of the Reform Bill*, and in his earlier years contributed much to the *Westminster* and *Edinburgh Review*.

ROERMOND (Fr. Ruremonde, called also by old writers Golswaard [i. e., Gold's Island] op de Maas), an old but lively town in the Netherlands, province of Limburg, at the junction of the Roer and the Maas. A suburb called St Jacob is connected with R. by a beautiful stone bridge over the Roer. The cathedral is one of the handsomest churches in the Netherlands. Pop. 8144, of whom about 300 are Protestant, 100 Jews, the remainder Roman Catholics. Principal industries are weaving woollen cloths, cottons, making paper, pipes, wax and tallow candles, cotton-spinning, calico-printing, refining salt, &c. R. is said by some authorities to have been the birthplace of the celebrated Mercator, others claiming the honour for Rupelmonde in East Flanders. It has often endured the horrors of being besieged and taken.

ROE STONE, a name locally given to those limestones which are formed of small globules like the roe of fishes. It has been translated into the scientific term *oolite*, and this is applied to that period in the earth's geological history in which the limestones with this structure chiefly occur.

ROGATION DAYS (Lat. *Feriæ Rogationum*), the Monday, Tuesday, and Wednesday before Ascension-day, so called because on these days the Litanies (q. v.) are appointed to be sung or recited by the clergy and people in public procession. The practice of public supplications on occasion of public danger or calamity is traceable very early in Christian usage; but the fixing of the days before Ascension for the purpose is ascribed to Mamercus, bishop of Vienne, in the middle of the 5th c., who on occasion of a threatened earthquake or other public peril in his city, ordered a public procession and prayer, for the purpose of averting the Divine anger. The usage being in harmony with the spirit of the times, became general and permanent, and the form of prayer employed is that known as the *Litany of the Saints*. In England, after the Reformation, the recitation of the Litanies upon these days was discontinued; but a memorial of the old practice long survived in the so-called Perambulation of Parishes (q. v.).

ROGER I., Count of Sicily and Calabria, and the founder of the Norman dynasty in those countries, was the youngest of the twelve valiant sons of Tancred de Hauteville, and was born in Normandy about 1031. Hearing of the wondrous success of his brothers (see GUISCARD), who had some time before departed to follow their fortunes, and had by this time gained possession of the greater part of Southern Italy, R. set out in 1058 to join them. On his arrival, he was deputed by his brother Robert to conquer Calabria, an achievement which was speedily executed. In 1060 he set out on an expedition against Sicily, then ruled by a number of Saracen chiefs; but he confined himself in this and the following expedition to predatory attacks on Messina and its neighbourhood. He then took and fortified Messina, making it the base of his future operations, and being joined by Robert, the two, at the head of their small band, performed a variety of almost miraculous exploits. They were gradually joined by the Christian inhabitants, especially when their success had given the latter room to hope for freedom from their Moslem masters; and in 1072, Palermo, the capital and chief stronghold of the Saracens, was yielded to the invaders. R. was then invested by his brother with the crown of Sicily, under the title of Count, but it was not till 19 years afterwards that he succeeded in thoroughly supplanting the Saracens, owing to the repeated reinforcements they received from Africa. R. had previously divided the country into fiefs, which he now distributed among his chief barons, whose relations to their subjects were regulated by him with justice and moderation. He had, in 1062, received from Robert his full share of Calabria, to which, on the death of the latter, he added (1085) a number of towns, wrested from Roger and Bohemond, Robert's two sons. He was now the chief of the Hauteville family, and the fame of his exploits and the greatness of his power, made his alliance be courted by the first princes of Europe. It was at this time he took the title of 'Grand Count,' to distinguish him from his vassals, and in 1098 he received from Pope Urban II., in recompense for his fidelity to the holy see, the privileges of refusing at his pleasure papal legates admission to his territory, and of appointing bishops. The last acts of his life were the building and endowing of churches and monasteries, among others the cathedral of Messina (1097). He died at Mileto in Calabria, 11th July 1101.

ROGER II., king of Sicily, second son of the preceding, was born in 1097, four years before the death of his father. His elder brother Simon having died in 1102, he became the heir to the Sicilian throne; and during his minority, the government was administered by his mother, a princess of Montferrat. When R. had taken the supreme authority into his own hands, his first care was to extend his estates. He compelled his cousin William to yield up the portions of Calabria and of the town of Palermo which Robert Guiscard had withheld from his father; and after the death of William (1127), he took possession of Apulia itself, obtaining his investiture in these new possessions (which were fiefs of the holy see) in the following year from Honorius II., who added to them that of the duchy of Naples. Ambitious of the title of king, he supported the faction of Pope Anacletus, his wife's brother, and received from him the title of king of Sicily, with rights of suzerainty over the duchies of Naples and Capua—the former being a Lombardo-Italian, and the latter a Norman principality. In return, R. established Anacletus on the pontifical throne in 1130; but the dispossessed pope, Innocent II., and the exiled princes of Capua and Naples, applied to the Emperor Lothar, who stripped R. of many of his acquisitions—the latter, however, recovering them almost the moment the German army had retired. At last, his bitter enemy, Innocent II., fell into his hands in 1139, and was compelled to withdraw the excommunications he had pronounced against R., and to consent to his retaining the territories he had acquired (excepting Naples), obtaining by these means not only his liberty, but the firm attachment of R. to the holy see, and his own recognition as lawful pope. In 1141, he received from Pope Lucius II. the right of

using the staff, ring, tunic, mitre, and other symbols of ecclesiastical dignity and power. In 1146, he revenged himself on the Greek emperor, who had been of the league with the pope and the emperor against him, by capturing Corfu, and pillaging Cephalonia, Negropont, Corinth, and Athens, returning to Sicily with an immense booty, including a number of workers in silk, by whom the silk-manufacture was first introduced into Sicily. He followed up these successes by the taking of Tripoli and other places on the African coast, and afterwards attacking the Zeirides—leaving, at his death, an African dependency which stretched from Morocco to Kairwan. He died at Palermo 26th February 1154. R. was, like his father, prudent and resolute, skilful both in the cabinet and on the field; but he had neither the fine deportment nor the generous soul of the first Roger. His mind was capable of great scope and untiring energy, so that the real interests of his states were never overlooked, and the orderly system of taxation and government was a pattern to the rest of Europe. He cared nothing for the religion of his subjects—they might be heathens if they chose; but obedience to himself and respect to the laws were rigorously demanded and enforced. His fleet was supreme on the seas, and his court surpassed in magnificence that of every other prince in Europe. He spent many of his later years in rearing religious edifices on a scale of extreme magnificence, of some of which remains still exist.

ROGERS, SAMUEL, an English poet, was born in London on the 30th July 1763. His father was a banker and member of a dissenting body. After having been carefully educated, R. was placed in his father's bank. His taste for literature and the company of literary men awoke at an early period, and he, accompanied by a friend, went one day to call on Dr Johnson, who was then living at Bolt Court, but his courage failed him when his hand was on the knocker. In 1786, he published his first book, entitled *An Ode to Superstition, and some other Poems*. In 1792, he published his *Pleasures of Memory*—the work on which his fame most securely rests. For a considerable period after this, he was silent. Meanwhile, he had retired from business, and in the possession of ample wealth, in his house in St James's Place, he employed himself with his Muse, his cook, the company of the literary celebrities of his time, and the collecting of pictures and articles of virtù. Then, and during the whole period of his subsequent life, his breakfasts were more famous than his poems. Critics might find fault with the one, but not with the other.

In 1812, he published *Columbus*, a not very striking poetical fragment. In 1814, *Jacqueline* appeared in the same volume with Lord Byron's *Lara*. In 1819, he issued *Human Life*; and in 1822, *Italy*. An edition of the last work, illustrated by the best artists, at the cost, it is said, of £10,000, appeared in 1836. After this date, he published nothing—his time being mainly devoted to taste, dining, epigram, and anecdote. Although aged, he was a greater gadder about than any man of his years in London. He rode or strolled in the parks, he haunted picture galleries, he was a constant attender at the opera. He was by far the oldest English poet. An accident in the street at last confined him to his room; and on the 18th December 1855, he died, aged 93. He read Goldsmith's *Traveller* when it was published, and he might have read Tennyson's *Maud*. He published his first book before Burns's first volume appeared at Kilmarnock.

As a poet, R. has much of the sweetness of Goldsmith, and much of the neatness and point of Pope; but he lacks entirely the splendour and richness which distinguished so many of his later compeers. In fact, all along, he belonged more to the era of Goldsmith than to the era of Wordsworth and Shelley. And as in poetry, so was it in the other intellectual fields in which he exercised himself. He was an eighteenth century man who had lived into the nineteenth. Since his death, his *Table Talk* has been published.

RO'GUE MONEY is, in Scotland, an ancient assessment which the freeholders of every county at any of the head courts directed annually to be made in such sums as they judged necessary for defraying the expense of apprehending offenders, subsisting them in jail, and prosecuting them. The functions of the freeholder in the matter were transferred to the Commissioners of Supply by 2 and 3 Will. IV. c. 65, s. 44. The tax was first appointed by a statute of 11 Geo. II. c. 28. The raising and application of the tax are not uniform in the various counties.

ROHILCU'ND, an extensive district in the Bengal Presidency, India, bounded on the W. and S.-W. by the Ganges, and on the E. by the kingdom of Oude. It derives its name from the Rohillas, an Afghan tribe which migrated hither in the 18th century. It comprises the five British districts of Bijnur, Moradabad, Bareilly, Budaon, and Shahjehanpur, and the protected state of Rampur.

RO'LAND, the hero of one of the most ancient and popular epics of early French or Frankish literature, was, according to tradition, the favourite nephew and captain of the Emperor Charlemagne. All that history tells us of him is simply this: In 778, when Charlemagne was busily engaged at Paderborn in organising the government of the recently-subjugated pagan Saxons, and superintending their collective baptism and formal admission into the Christian church, he was visited by a Saracen chief, who, being unwilling to recognise the supremacy of the Calif of Cordova, offered to put the Frankish sovereign in possession of several towns south of the Pyrenees which were under his rule. Charlemagne, accepting the offer, marched with a numerous army through the territory of Gascony, whose duke, Loup, he constrained to do him homage, and took Pampelona and Saragossa. Finding, however, that his Saracen ally gave him but little aid, he turned back to return to France; and it was during this retreat, while the Christian army was slowly threading its way through the narrow valley of Roncevaux or Roncesvalles (q. v.), that R., commander of the Marches of Bretagne, who commanded the rear-guard, was suddenly attacked by a large body of Vascons, lying in ambush in the surrounding woods, and slain while fighting gallantly. Beyond these meagre details, all that we read of R. is traditional. The oldest version of the *Song of Roland*, forming part of the *Chansons de Geste*, which treat of the achievements of Charlemagne and his paladins, belongs to the 11th c., although it is probable that the original compositions are not much later than the period to which they refer. Throughout the middle ages, the *Song of Roland* was the most popular of the many heroic poems current, and William of Normandy, when on his way to conquer England, had it sung at the head of his troops, to encourage them on their march; while at the present day, the traditionary memory of the heroic paladin is still held in honour by the hardy mountaineers of the Pyrenees, amongst whose dangerous defiles the scene of his exploits and death is laid. According to the poem, Charlemagne had been six years in Spain, when, resolving to return to France, he, by the advice of R., sent his captain, Ganelon, on

an embassy to the pagan king, Marsilius of Saragossa, to receive the homage which he had pledged himself to perform. The mission was a dangerous one, as all other ambassadors to the king had been slain, and Ganelon, wishing to revenge himself on R., proved a traitor, and betrayed to Marsilius the route which the Christian army were to take. The consequence was, that after Charlemagne had safely crossed the mountains with the main part of his forces, R., who commanded a rear-guard of 20,000 men, was surprised within the narrow valley of Roncevalles, by a terrible army of all the pagan nations of the world. R., who possessed an enchanted horn, which could have been heard far beyond the mountains, might have recalled his uncle; but despising such pusillanimity, he fought on till 100,000 Saracens lay slain around him, and the 50 warriors who alone remained alive to aid him. Another army of 50,000 men of Carthage, Ethiopia, and Canada now pours down upon him. At length he blows his horn, which is heard by Charlemagne, who, however, does not return, as Ganelon persuades him once, twice, and thrice that R. is only hunting the deer; and not until the veins of R.'s neck have burst with the violence of the blast does the emperor retrace his steps. In the meanwhile, R. has dragged his dying limbs to the foot of Mount Cisaire, above Roncevalles, where, after having sung his death-song, and thrown his trusty and enchanted sword Durandal into a poisoned stream, where it still remains, he dies exhausted from his many wounds. Charlemagne, who arrives too late to save him, avenges his death in a series of marvellous battles and bloody victories, whose delineation imparts a sufficiently dark colouring to the closing passages of this sombre epic.

ROLAND DE LA PLATIÈRE, JEAN MARIE, a French minister of the revolutionary period, was born at Mizy, near Villefranche (Beaujolais), 18th February 1734. His first independent appointment was that of inspector ordinary at Amiens. In 1775, at the house of a friend in Amiens named Sophie Cannet, he met Mlle. Jeanne Phlipon, a young woman of brilliant genius and fascinating beauty, and after a courtship of four years they were married, 4th February 1780. When the Revolution broke out in 1789, R., as well as his wife, became a decided partisan of the movement. In 1791, he was sent to Paris by the municipality of Lyon, to represent to the Constituent Assembly the deplorable condition of the Lyonnese weavers. After the dissolution of the Constituent Assembly, he founded at Lyon the *Club Central*, the members of which, marked by their attachment to constitutional liberty, received the name of *Rolandins*. Towards the close of 1791, he fixed himself at Paris, and soon became one of the heads of the Girondist or moderate section of the Republicans. In March 1792, he was appointed Minister of the Interior, a situation which he held till January 1793, when he resigned it, despairing of seeing moderate counsels adopted. After placing his accounts in the hands of the Assembly, he asked permission to withdraw from Paris, but it was refused, and an illegal attempt was made to arrest him, which failed. Immediately after, he fled, and concealed himself in Rouen. When news reached him of the execution of his wife, he committed suicide at a small village in the environs of Rouen, 15th November 1793. R. wrote and published several memoirs and disquisitions on branches of industry, besides 6 vols. of *Letters* addressed to his wife before their marriage, from Switzerland, Italy, Sicily, and Malta.

ROLAND, MADAME (*née* MARIE JEANNE PHLIPON), wife of the preceding, was the daughter of Pierre Gratien Phlipon, an engraver, and was born at Paris, 17th March 1754. The precocity of her intelligence was remarkable. At the age of four, she had quite a passion for reading; at seven, she learned by heart a treatise on heraldry; at eight, she used to carry Plutarch with her to church, while the *Jerusalem Delivered* of Tasso, and the *Télémaque* of Fénelon fired her childish imagination. At the same time, an ardent piety began to develop itself, and when only eleven, she entered the *Maison des Dames de la Congrégation*, in the Faubourg Saint-Marcel. Here she formed a close friendship with two young girls from Amiens, Henriette and Sophie Cannet, particularly with the latter, which was fruitful in consequences. On her return to her father's house after the lapse of two years, 'a change came o'er the spirit of her dream.' She no longer cared for the so-called 'religious' writers—the defenders of the Bible and the Church. Her faith was slowly changing from the dogmatic creed of Bossuet to the 'naturalism' of the Encyclopédists and 'Philosophes.' In ethics now as ever, her preference for the Stoical system was marked. Shortly after the death of her mother in 1773, she read for the first time *La Nouvelle Héloïse*, which seemed to her (as it has to many another young impassioned soul) a veritable revelation. Greatly distressed by the imprudent conduct of her father, she again withdrew, at the age of 25, to the *Maison des Dames de la Congrégation*, and once more attempted an 'austere' life; but M. Roland (q. v.), who had already known her for five years, now came forward, and rescued her from a career which must ultimately have proved equally unsatisfactory to her reason and conscience, by offering her his hand. She was 25, and he 45. There was certainly something unpoetical in the disparity of their years, but then, Mademoiselle Phlipon knew that 'ideal' matches were made only in heaven, and so she accepted calmly the inspector of manufactures. Their marriage was celebrated 4th February 1780. It is unnecessary to follow the remainder of her career, which was of course identical with her husband's until his flight from Paris 31st May 1793. The same night she was herself arrested, and imprisoned in the Abbaye. A more dauntless and intrepid spirit never entered its walls! Released on the 24th of June, she was instantly rearrested by the very commissaries who had set her at liberty, without the shadow of a tangible accusation, and confined in Saint Pélagie. Madame R. spent the period of her imprisonment in study, in the composition of her political *Mémoires*. Summoned before the Revolutionary Tribunal in the beginning of November, she was condemned, and on the 9th was guillotined, amid the shoutings of an insensate mob. It is said that while standing on the scaffold, she asked for a pen and paper that she might 'write down the strange thoughts that were passing through her head.' Only a genuine child of the French Republic could have been so ostentatiously speculative at such a moment. Still more celebrated is her apostrophe to the statue of Liberty, at the foot of which the scaffold was erected: 'O Liberty, what crimes are committed in thy name!' or, according to another version: 'Liberty, how they have played with thy name!'—See *La Correspondance de Madame Roland avec les Demoiselles Cannet* (2 vols., Paris, 1841); *Lettres Autographes de Madame Roland, adressées à Bancal des Issarts* (Paris, 1835).


Roll Moulding

ROLL, a round moulding much used in Gothic

architecture. It is also modified by the introduction of a fillet, and is then called the roll-and fillet moulding.

ROLL OF ARMS, a heraldic record of arms, either verbally blazoned or illuminated, or both, on a long strip of vellum, rolled up, instead of being folded into leaves. Rolls of arms are the most important and most authentic materials for the history of early heraldry. In England, they go back to the reign of Henry III, the oldest being a copy of a roll of that reign, containing a list of the arms borne by the sovereign, the princes of the blood, and the principal barons and knights between 1216 and 1272, verbally blazoned without drawings. The original has been lost, but the copy which, having been made by Glover, Somerset herald, in 1586, is called 'Glover's Roll,' is in the English College of Arms. This roll exhibits heraldry as at that early period already consolidated into a system. In the British Museum (Harl. Coll., 6589) is a copy of another roll of the middle of the 13th c., containing 700 coats tricked, that is, drawn in pen and ink. The *Roll of Caerlaverock* is a heraldic poem in Norman French, reciting the names and arms of the knights present at the siege of Caerlaverock in 1300. It has been published with notes by Sir N. H. Nicolas. Copies exist of rolls of the knights who were with Edward I. at the battle of Falkirk.

ROLLER (*Coracias*), a genus of birds very generally referred to the Crow family (*Corvidæ*), but by many naturalists to the Bee-eater family (*Meropidæ*), with which they regard the habits and colours of the species as indicating a closer alliance. The bill is moderately large, compressed towards the point, straight, the upper mandible curved downwards at the point, the sides bristled at the base, the gape wide, the legs short and strong, the wings long. The colours are in general very brilliant. Mr Swainson says of the BLUE-BODIED R. (*C. cyanogaster*) of Western Africa, that 'no effort of art can possibly do justice to those inimitably rich lines of ultramarine, beryl colour, and changeable fawn with which it is ornamented, for there are no tints hitherto



Roller (*Coracias garrula*)

discovered, either mineral or vegetable, which will enable the painter to produce their successful imitation.' The species are pretty numerous, all natives of the Old World, and mostly of the warmer parts of it. One only is found in Europe, the COMMON R. (*C. garrula*), a bird nearly equal in size to a jay, with head, neck, and wing coverts greenish blue, other shades of blue strongly marked in the wings. This bird is abundant in the north of Africa, and in some parts of Asia; it is partially migratory, and is rare in Britain. It tosses its food, which consists of insects or parts of plants, into the air before eating it, swallowing it when it falls in a proper direction for entering the throat. The name R. is derived from its habit of tumbling in the air like a tumbler-pigeon. It is an inhabitant of woods. It is a very shy bird, and the sportsman always finds it difficult to approach. In the countries where it is abundant, as in some islands of the Mediterranean, it is in high esteem for the table.

ROLLER, an agricultural implement which has been long in use, consisting of a cylinder of wood, stone, or iron, placed in a frame, so as to revolve like a wheel and drawn over the land by a horse. The weight of the roller is greater or less according to the purpose for which it is intended: the breaking of stiff clay clods, the consolidating of very light soils after frost, the hardening of the surface of the ground to check evaporation, the levelling of an uneven surface before harvest operations, &c. For these and such purposes, the roller is in constant use. The introduction of hollow cylinders of iron instead of solid ones of wood or stone is an improvement of no remote date, and was the first change on the old simple implement which was afterwards further modified by dividing the cylinder into two parts to give greater facility in turning and to diminish its injurious action in scraping the soil before it while turning; and this process of division being carried further, with other modifications, giving each part or wheel a more independent action, and breaking up the uniformity of surface by giving a raised wedge-like edge to the circumference of each wheel, the result is a *clod-crusher*.

ROLLER, used as part of the inking apparatus in letter-press printing, is of modern invention. In the old process of applying the ink to the surface of types, stuffed leather balls were made use of, which were not only difficult to keep in proper order, but were inapplicable to cylinder printing. The first improvement on the stuffed balls consisted in covering them with a soft and elastic composition, such as was employed in the Staffordshire potteries. Catching at this idea, the inventors of cylinder printing-machines made rollers by coating longitudinal and rounded pieces of wood with the composition, by means of casting in a mould. This invention came generally into use between 1814 and 1818, everywhere superseding balls, and rendering printing-machinery practicable.

The method of making inking-rollers is very simple. A roller may be of any length, to suit work of different kinds; for hand-presses it is usually about 30 inches long, but longer for machines according to their dimensions. The thickness is about 3 inches, of which the composition on the wood is probably three-quarters of an inch all round. The wood or centre being fixed upright in an iron mould, the composition is poured in when in a hot liquid state, and then left to cool. When cold, the mould, which is in halves, finely-jointed and held together, is opened, and the roller taken out; by a little trimming, it is ready for use. The composition consists of a due proportion of fine glue and treacle or molasses, boiled together, and thoroughly blended—the result being a substance resembling soft india-rubber. The proportions of the two ingredients depend on the state of the atmosphere. In summer, one pound of glue to one pound of treacle may form a suitable mixture; but in winter, it may be requisite to give three pounds of treacle to one pound of glue, in order to insure the proper elasticity. Rollers, in time, shrivel and waste by use, and the composition may then be remelted, along with some small addition of new materials. In all cases, the rollers require to be kept very clean, and suspended in a rack when not in use. The manufacture and supply of rollers for printers constitute a distinct business in London;

but elsewhere, as far as we know, every printing establishment of any consequence possesses means of fabricating rollers for itself.

ROLLIN, CHARLES, a French historian, who formerly enjoyed, if he did not merit, an extensive popularity, was the son of a cutler, and was born in Paris, January 30, 1661. He studied at the Collège du Plessis, where, in 1683, he became assistant to the Professor of Rhetoric, and four years later obtained the chair for himself. In 1688, he was called to the chair of Eloquence at the College Royal de France, and for some ten years he discharged the duties of his office with remarkable zeal and success. In 1694, he was chosen rector of the university of Paris, a dignity which he held for two years, and signalised his brief tenure of office by many useful reforms, both in regard to discipline and study, and by his warm defence of the privileges of the university. His efforts to revive the study of Greek, then falling back into neglect, were particularly creditable to him, and altogether his career as rector constitutes perhaps his best claim to the regard of posterity, and has certainly left a more permanent impression than his writings, for its influence is perceptible even to the present day. In 1699, he was appointed coadjutor to the principal of the College of Beauvais, but was removed from this situation in 1712 through the machinations of the Jesuits, for R. was a strenuous Jansenist. For the next three years he devoted himself exclusively to learned study, the fruit of which was his edition of Quintilian (Paris, 2 vols. 1715). In 1720, he was re-elected rector of the university, and in 1726 published his *Traité des Études*, which M. Villemain has pronounced 'a monument of good sense and taste,' and which is justly regarded as his best literary performance, for his *Histoire Ancienne* (Paris, 12 vols. 1730–1738), though long prodigiously popular, and translated into several languages (the English among others), is feeble in its philosophy, jejune in its criticism, and often inaccurate in its narrative. Nevertheless, to multitudes, both in this country and in France, it has formed the introduction to the study of ancient history. Frederick the Great, then the Prince-royal, of Prussia, among other princely notabilities, wrote to compliment the author, and opened up a correspondence with him. In 1738, he published his *Histoire Romaine* (Paris, 9 vols.), a much inferior work, now almost forgotten. He died September 14, 1741.

ROLLING MILL, one of the most important of modern inventions for the working of metals. It was first introduced practically by Mr Cort in 1781, and since then has gradually become more and more useful, as its capabilities have been developed. Under the article IRON (q. v.), there is a figure of the iron rolling-mill, by means of which bars of iron are rolled or drawn out; and it will be at once seen that the same machine will do for other metals; moreover, the rolls may be engraved so as to impress a pattern on the bar as it passes through; this is done by the brass-workers to a great extent, and tubes of brass, copper, tin, &c. are also operated on in a similar way, a mandrel or rod of iron being fitted inside the tube, to sustain the pressure of the rollers.

ROLLS, MASTER OF. See MASTER OF THE ROLLS.

ROLLS OF COURT, in Scotch Law, mean the lists of causes depending in the Court of Session.

ROMAGNA. See PAPAL STATES.

ROMAINE, REV. WILLIAM, an English divine of the last century, noted for the ardour with which he preached 'evangelical' and Calvinistic doctrines in an age of religious apathy, was the son of a corn-dealer in Hartlepool, and was born there, September 25, 1714. His father was a French Protestant refugee. Young R. was educated at the grammar-school of Houghton. He was ordained a priest in 1738, and immediately obtained a curacy near Epsom. In 1739, he published a sermon preached before the university of Oxford, in which he attempted to shew, in opposition to the view maintained by Warburton in his *Divine Legation of Moses*, that the doctrine of a future state is 'expressly mentioned,' and even 'insisted on,' in the Pentateuch. This led to a controversy with Warburton. In 1747, he published the first volume of a new edition of Calasio's *Hebrew Concordance and Lexicon*, the fruit of seven years' labour. The only thing in connection with R.'s edition that now calls for notice is the fact, that he took extraordinary liberties with the original, omitting, for example, the author's account of the word which is usually rendered 'God' and substituting his own in the body of the work! In 1748, he was chosen lecturer of St Botolph's in London, and, in the following year, lecturer of St Dunstan's in the West. Two years later, he was appointed assistant morning-preacher at St George's, but was afterwards deprived of the situation by the rector, Dr Trebeck, who was jealous of his popularity, and averse to the 'plainness' of his preaching. His 'evangelicalism' grew with his years, and at length, in 1757, in a sermon on the *Lord Our Righteousness*, it became so offensive to the 'dignitaries' of Oxford that the university pulpit was in future closed against him. Some years before this R. had been appointed to the professorship of astronomy in Gresham College, for which he was not fit, and which he did not retain. His intellect was anything but scientific in its character, as will readily be understood when we state that he allowed his 'zeal' for Hutchinsonian speculations to lead him into opposition to the Newtonian philosophy. In 1756, he became curate and morning-preacher at St Olave's, Southwark, a situation which he exchanged in the course of a year for a preachership at St Bartholomew the Great, near West Smithfield. In 1766, he was chosen by the parishioners rector of St Andrew, Wardrobe, and St Anne, Blackfriars, an office which he held till his death, July 26, 1795. Besides what has been already mentioned, R. published *Twelve Sermons upon Solomon's Song* (1759), *Twelve Discourses upon the Law and the Gospel* (1760), *The Life of Faith* (1763), *The Scripture Doctrine of the Sacrament of the Lord's Supper* (1765), *The Walk of Faith* (1771), *An Essay on Psalmody* (1775); *The Triumph of Faith* (1795). His works were republished in a collected form, in 8 vols., in 1796, by the Hon. and Rev. W. B. Cadogan, who prefaced them with a life of their author.

ROMAN ALUM. See ROCH ALUM.

ROMAN ARCHITECTURE. Of the early architecture of Rome and the other Latin cities, comparatively little is known. With the conquest of Carthage, Greece, and Egypt, the Romans became acquainted with the arts of those countries, and began to endeavour to use them for the embellishment of the imperial city. Besides, Rome under the empire was the capital of the world, and attracted artists from every country. The result was that the architecture of Rome became a mixed style. It was all imported, and partook of the character of the importers. The great interest of Roman architecture is, that it is a mixture and amalgamation of all ancient styles, and the starting point for all modern styles. It is thus the

connecting link between ancient and modern art; the whole history of Roman architecture being that of a transition, slow but steady, from the external architecture of the Greeks to the internal architecture of the Christians Rome borrowed from Greece the oblong peristylar temple, with its horizontal construction and decoration, and the various 'orders' See COLUMN, GRECIAN ARCHITECTURE From the Tuscans, probably, were derived the circular form of temple and the circular arch, which became leading features in the development of the future Roman style.

The *Orders* imported from Greece were the Doric, Ionic, and Corinthian (q v) These were all used in Rome, but with some modifications, the Doric, for example, being never used as in Greece, but without fluting, and with the capital and entablature altered, and a base added, so as to make the style more similar to the others, with which it was often associated The Ionic had the volutes turned out angularwise, so as to present a similar face in each direction The favourite 'order' of the Romans, however, was the Corinthian It was invented in Greece, but more fully developed in Rome where it suited the desire which existed for richness and luxuriance in architecture. Many fine examples of

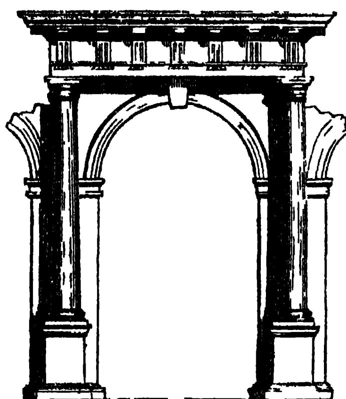


Fig 1—Doric Arcade.

this style exist in Rome (as the Pantheon, Jupiter Stator, &c), and in the provinces (as the Maison Quarrée at Nîmes, Baalbec, &c), the capitals, wherever found, being designed in endless variety The composite order was an invention of the Romans, and is sometimes called *the Roman order* It is a combination of the Ionic and Corinthian. All these orders were used by the Romans, but in a manner peculiar to themselves, they combined with the Greek orders the arch They placed the columns (fig 1) at wide intervals, and set them on pedestals, to give them and the entablature a proper proportion, whilst behind the columns they placed square piers, and from them threw arches which supported the wall. This was the favourite Roman style, and may be seen in all their important works (amphitheatres, arches, baths, &c.) They piled one order above another, marking each story with the entablature As the style proceeded, vaulting and arching became more common, especially in internal construction, but the horizontal ornamentation was never entirely abandoned. Arches of this construction were thrown from pillar to pillar behind the entablature, and gradually the pier was omitted, and the arch openly thrown from pillar to pillar, the architrave bent round it, and the cornice continued horizontally above.



Fig 2 - Courtyard at Spalatro.
(From Sir Gardner Wilkinson's *Dalmatia*)

The buildings executed by the Romans are very varied in their character, but the same style was used for temples, baths, amphitheatres, triumphal arches, tombs, &c The earliest temples of which remains now exist are those of Jupiter Stator in the Forum, Jupiter Tonans, and Mars Ultor, all of the Augustan epoch and each with only three columns left These are supposed to have been nearly peripteral, and it is worthy of notice that the cells are all large, and one of them has an apse

One of the most interesting temples of Rome is the Pantheon The portico is of the age of Augustus, but the rotunda is probably considerably later The dome of the interior is a splendid example of the progress of Roman architecture in developing the use of the arch, and transferring the decoration from the exterior to the interior The former is in this case totally sacrificed to the latter, but the interior has not yet been surpassed for boldness of construction or simplicity and sublimity of effect. Other examples of circular temples, on a small scale, are found at Tivoli and in Rome, both dedicated to Vesta

The greatest works of the Romans, however, were not their temples The basilicas (q v), Amphitheatres (q v) and Baths (q v) are far more numerous and more stupendous as works of art, and

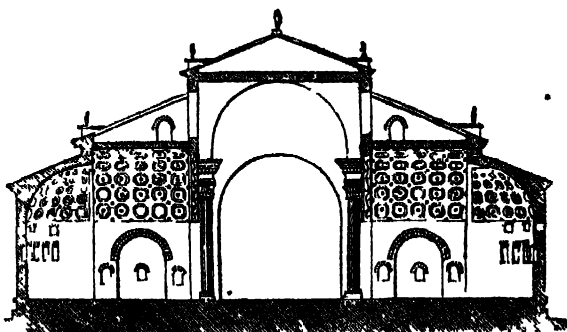


Fig 3—Transverse Section of Basilica of Maxentius.
(From Fergusson's *Hand-book of Architecture*)

all shew how well the Romans had succeeded in producing an internal architecture, which at a later period became so useful as a model for Christian buildings. The Basilica of Trajan is a type of the Christian wooden-roofed churches, while that

of Maxentius (fig. 3), with its great intersecting vaults, its vaulted aisles, and buttresses, contains the germs of the greatest Christian cathedrals. The Roman Amphitheatres (q. v.) have never been surpassed for size and grandeur, or for suitability to their purpose. And of the Baths (q. v.), sufficient remains still exist, although much decayed, from the perishable nature of the brick and stucco employed in their construction, to prove that the scarcely credible descriptions of contemporaries were surpassed by the magnificence of the buildings themselves.

Among the other varied public works of the Romans are their Aqueducts (q. v.) and bridges, Triumphal Arches (q. v.), pillars of victory, and tombs. Of the tombs of the Romans, the earliest and best specimen is that of Cæcilia Metella (wife of Crassus), on the Appian Way (fig. 4). It consists

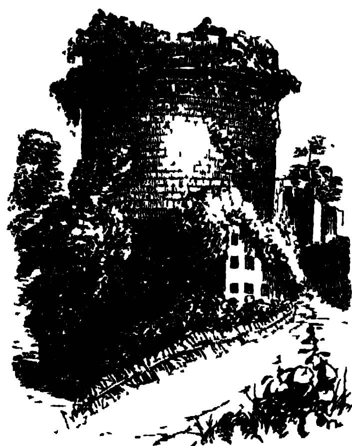


Fig. 4.—Tomb of Cæcilia Metella.
(From Fergusson's *Hand-book.*)

(like most Roman tombs) of a round drum placed on a square basement, and was probably surmounted by a conical roof. The tomb of Augustus was similar, on a very large scale, and the sloping roof was broken into terraces planted with trees. That of Adrian (now the castle of St Angelo in Rome) is another enormous example. The tombs were generally ranged along the ways leading to the gates of cities.

The later tombs of Rome are well worthy of study, as they contain many specimens of the

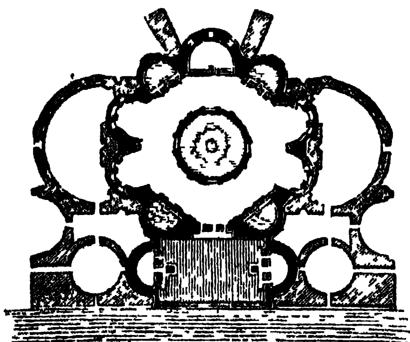


Fig. 5.—Plan of the Temple of Minerva Medica at Rome.

transition towards the Christian style. They are generally vaulted, frequently with domes, as, for instance, the tombs of St Helena and Sta Costanza. Mr Fergusson also places the so-called 'Temple of Minerva Medica' (fig. 5) amongst the tombs. It is a beautifully arranged building with ten sides, all containing deep niches (except the side with the door), surmounted by a clear-story, with ten well-proportioned windows. The vault is polygonal inside and outside; and the pendentives, ribs, buttresses, &c., which played so important a part in the Christian architecture both of the East and West, are distinctly used in its construction.

Of the domestic architecture of the Romans, we have many wonderfully preserved specimens in Herculaneum and Pompeii, shewing both the arrangements and decorations of the dwellings of all classes. Of the great palaces and villas, however, none remain except the palace of Diocletian, at Spalatro, in Dalmatia. It is an important building, as it shews many steps in the progress of the style.

ROMAN CATHOLIC CHURCH, the community of Christians throughout the world who recognise the spiritual supremacy of the Pope or Bishop of Rome, and are united together by the profession of the same faith, and the participation of the same sacraments. The subject will be most conveniently treated by considering under separate heads the history of this great Christian community; its doctrinal and disciplinary system; and finally, its organisation and constitutional forms.

Although a few other points of doctrinal difference separate the creed of the Roman Church from that of the Greek, Russian, and oriental communions, yet it may truly be said that the most striking and palpable ground of division between Rome on the one side, and all the rest of the communions named above upon the other, lies in the claim of supremacy in spiritual jurisdiction on the part of the Roman bishop. This history of the Roman Church, therefore, in relation to the ancient oriental churches, is, in fact, the history of the claim to supremacy. Without entering into the merits of the question, we shall merely indicate in a brief outline the history and the nature of the claim as it is held in the Roman Catholic communion. In the minds of Roman Catholics, the claim of supremacy on the part of the Bishop of Rome rests on the belief, that Christ conferred on Peter a 'primacy of jurisdiction' over his church; that Peter fixed his see at Rome, and died bishop of that church (a position which some Protestant historians have called into question altogether); and thus, that the bishops of Rome, as successors of Peter, have also succeeded to his prerogatives of supremacy. In this light, Catholic historians read the facts of the early history of the church—and they trace to this acknowledged superiority of the see of Peter numerous references to Rome on matters of doctrine or discipline; appeals from other churches, even from the great churches of Alexandria, Antioch, and Constantinople; depositions or nominations of bishops, examination and condemnation of heresies, of which the first five centuries, especially the 4th and 5th, present examples, but in which Protestant historians only recognise the natural result of the political and social superiority of Rome as the capital of the Roman empire. The letters of Pope Leo the Great, in the commencement of the 5th c., shew beyond question that the bishops of Rome, from whatever cause, claimed to speak and act with authority in the affairs of the church; and the first direct challenge to this claim was made by the patriarch of Constantinople, in the person of Acacius, and led to a schism of many years, which, however, terminated in the humiliation of the younger see. It was a powerful argument for the claims of Rome, that in all the controversies upon the Incarnation—

the Arian, the Nestorian, the Eutychian, the Monothelite—not only was her orthodoxy never impeached, but, on the contrary, she even supplied at every crisis a rallying point for the orthodox of every church and of every country. It was so, again, in the Iconoclast controversy; and although Constantinople more than once, in the time of Gregory the Great, and still more in that of Nicholas I., renewed the struggle for supremacy, or even equality, the position of Rome continued to be recognised. The separation of the Greek Church and her dependencies, under the patriarch Michael Cerularius in the year 1054, was but the withdrawal of a certain space from the extent of her territorial jurisdiction. If it had any effect upon her position within that portion of the church which remained faithful, it was rather to enhance the dignity of Rome, and to widen her prerogatives. The abandonment of Italy by the emperors to its fate under the invasion of the barbarians, led to the establishment of the temporal sovereignty of the popes. The total disruption of the Western Empire, and the consequent social disorganisation of Europe, combined with the spiritual authority of the Roman bishop to bring about the general recognition of his authority throughout the kingdoms of Europe as an arbiter in the temporal relations of sovereigns with their subjects, and of sovereigns towards each other. This extraordinary temporal authority was at once the consequence of his acknowledged spiritual power, and tended to heighten and to consolidate the very power in which it had its origin; and even Protestants must recognise the Roman Church of the medieval period as absorbing in itself almost the whole of European Christendom, and as the only public (even though they believe it degenerate and corrupt) representative of the church in the West. The temporary withdrawal of the papal residence from Rome to Avignon brought with it, from various causes, not the least of which was the weakening of the prestige of the 'see of Peter,' a notable diminution of the at least temporal power of the popes, which was still further weakened by the long western schism, by the conflicts of the rival pontiffs, and the scandals which arose therefrom; and the origin and progress of the modern political institutions which then began to break upon the world, so modified the public relations of church and state as by degrees to undo the condition of society in which the temporal power had its foundation. The great revolution of the 16th c. completed the process; and when the popes seriously addressed themselves to the defence of the doctrinal system, which was the foundation of their authority, it was no longer in the character of arbiters of the temporal destinies of the world, but of simple disputants in the arena of theological science, in which their adversaries could command equally with themselves the means of appealing to the intelligence and to the religious sympathies of men.

Nor was the revolution with which the popes thus found themselves face to face without its influence in the external history of the Roman Church. The defections consequent on the Reformation, and at first numerous and formidable, received a check. The great Council of Trent—one of the necessities of self-defence which the rude assault of the Reformers entailed—did more to systematise, to define, and to present in popular form the doctrinal belief of Rome, than had been accomplished by the united efforts of the schoolmen of the three centuries which preceded the Reformation; while the decrees of Reformation which it enacted, and still more the schemes of local and individual reform which it originated, and to which it gave the impulse as well as the example, tended to bring about, by the natural process of self-purification, those ameliorations in the struggle towards which the first efforts at reform had their foundation. The latter half of the 16th c. was a period of new life in the Roman Church. The celebration of local synods, the establishment of episcopal seminaries, the organisation of schools, and other provision for religious instruction, above all, the foundation of religious orders of both sexes, in all which this active work of the church was one of the striking and prominent characteristics, had the effect of arresting in many countries the progress of Protestantism, at first rapid and decisive; and Lord Macaulay has traced out with curious minuteness the line which marks in the several countries the origin and the progress of this religious reaction.

From the end of the 16th c., therefore, the position of the R. C. Church, especially in her external relations, may be regarded as settled. The local distribution of the rival churches in the world has not been materially altered since that time. But in her relation to the state, the Roman Church has since passed through a long and critical struggle, which is detailed under the heads GALLICAN CHURCH, FEBRONIANISM, INNOCENT XI. The new theories to which the French Revolution gave currency have still further modified these relations; but in most of the European kingdoms they have been regulated either by concordat or by some similar mutual agreement. Many conflicting claims, however, on either side still exist; but the policy of the R. C. Church in the conflict with the state has generally been to record her protest against any violation of right, but the protest having been made, to submit under protest, unless in what are considered the essentials of faith or of discipline.

The details of the doctrinal system of the R. C. Church may be best explained from her latest authentic creed, that commonly called of Pius V., drawn up as a summary of all the authoritative teaching up to that time, including the decrees of the Council of Trent. It is only necessary to premise that, while in the view of Catholics (see RULE OF FAITH) the doctrine must be based on the Word of God, written or unwritten, the church is the only authoritative judge of that Rule of Faith. The tribunals which are held to represent this teaching, as well as the subjects to which the privilege extends, and the limits within which it is held to be exercised infallibly, have all been explained under the head INFALLIBILITY (q. v.). But Catholics hold, that while the church has authority, when doubts or difficulties arise, to propound authoritatively new definitions of faith, nevertheless these new definitions must not be regarded as additions to the original faith of the church, or to the original deposit of divine teaching, but only as expositions of former articles, or at most as developments of what already existed in the germ, and has but been evolved by controversy, or brought into practical action by the progress of time, and the change of the external relations of the church. The creed of Pius V. is as follows:

'I, N. N., with a firm faith believe and profess all and every one of those things which are contained in that creed which the holy Roman Church maketh use of. To wit: I believe in one God, the Father Almighty, Maker of heaven and earth, of all things visible and invisible, and in one Lord Jesus Christ, the only begotten Son of God, born of the Father before all ages; God of God; Light of Light; true God of the true God; begotten, not made; consubstantial with the Father, by whom all things were made. Who for us men, and for our salvation, came down from heaven, and was incarnate by the Holy Ghost of the Virgin Mary, and

was made man. He was crucified also for us under Pontius Pilate, suffered, and was buried. And the third day he rose again according to the Scriptures: he ascended into heaven, sitteth at the right hand of the Father, and shall come again with glory to judge the living and the dead; of whose kingdom there shall be no end. I believe in the Holy Ghost, the Lord and life-giver, who proceedeth from the Father and the Son; who, together with the Father and the Son, is adored and glorified; who spake by the prophets. And in one holy, Catholic, and Apostolic Church. I confess one baptism for the remission of sins; and I look for the resurrection of the dead, and the life of the world to come. Amen.

'I most steadfastly admit and embrace the apostolical and ecclesiastical traditions, and all other observances and constitutions of the same church.

'I also admit the holy Scriptures, according to that sense which our holy mother the Church hath held and doth hold; to whom it belongeth to judge of the true sense and interpretation of the Scriptures; neither will I ever take and interpret them otherwise than according to the unanimous consent of the Fathers.

'I also profess that there are truly and properly seven sacraments of the new law, instituted by Jesus Christ, our Lord, and necessary for the salvation of mankind, though not all for every one: to wit - Baptism, Confirmation, the Eucharist, Penance, Extreme Unction, Order, and Matrimony; and that they confer grace; and that of these, Baptism, Confirmation, and Order cannot be repeated without sacrilege. I also receive and admit the received and approved ceremonies of the Catholic Church, used in the solemn administration of the aforesaid sacraments.

'I embrace and receive all and every one of the things which have been defined and declared in the holy Council of Trent concerning original sin and justification.

'I profess, likewise, that in the Mass there is offered to God a true, proper, and propitiatory sacrifice for the living and the dead; and that in the most holy sacrament of the Eucharist there is truly, really, and substantially the Body and Blood, together with the soul and divinity of our Lord Jesus Christ; and that there is made a conversion of the whole substance of the bread into the Body, and of the whole substance of the wine into the Blood; which conversion the Catholic Church calleth Transubstantiation. I also confess that under either kind alone Christ is received whole and entire, and a true sacrament.

'I constantly hold that there is a Purgatory, and that the souls therein detained are helped by the suffrages of the faithful.

'Likewise, that the saints reigning together with Christ are to be honoured and invocated, and that they offer prayers to God for us, and that their relics are to be had in veneration.

'I most firmly assert that the Images of Christ, of the Mother of God, ever Virgin, and also of other saints, ought to be had and retained, and that due honour and veneration are to be given them.

'I also affirm that the power of indulgences was left by Christ in the church, and that the use of them is most wholesome to Christian people.

'I acknowledge the holy Catholic, Apostolic, Roman Church for the mother and mistress of all churches; and I promise true obedience to the Bishop of Rome, successor of St Peter, Prince of the Apostles, and Vicar of Jesus Christ.

'I likewise undoubtingly receive and profess all other things delivered, defined, and declared, particularly by the holy Council of Trent; and I condemn, reject, and anathematise all things contrary thereto, and all heresies which the church hath condemned, rejected, and anathematised.

'I, N. N., do at this present freely profess, and sincerely hold this true Catholic faith, out of which no one can be saved; and I promise most constantly to retain and confess the same entire and inviolate, by God's assistance, to the end of my life.'

In addition to these articles, the R. C. Church has since the compilation of the creed of Pius V. defined certain further articles in the controversy on grace, which arose from the teaching of JANSENIUS (q. v.), and still more recently that of the IMMACULATE CONCEPTION OF THE BLESSED VIRGIN MARY (q. v.).

The details of the discipline of the R. C. Church would be out of place here. But it may be observed that the R. C. Church leans towards asceticism, as regards the practice of fasting, with less rigour than the Greek and oriental communions; while, on the contrary, as to the celibacy of the Clergy (q. v.), her law is much more stringent; all the clergy of the R. C. Church in the greater orders, including sub deacons, being so strictly bound to celibacy, that a marriage contracted after ordination is invalid by the church law. See ORDERS. In all that regards the general discipline of the whole church, only the pope or a general council is considered to have power to legislate; national or provincial synods for a kingdom or province, and bishops for their own dioceses.

The constitution of the R. C. Church has been in great part explained in the article HIERARCHY. It may be necessary to add that, under the generic name Roman Catholics are comprised all those Christians who acknowledge the supremacy of the Roman pontiff, even though they be not of the Roman or Latin RITE (q. v.). Not a few individuals and churches of other rites are included under this designation, Greeks, Slavonians, Ruthenians, Syrians (including Maronites), Copts, and Armenians; and these communities are permitted to retain their own national liturgy and language; and for the most part, their established discipline and usages. The most remarkable examples of the diversity of discipline thus introduced under the common rule of the Roman pontiff are the retention of the use of the cup for the laity, and the permission of the marriage of the clergy.

As regards its organisation for the purposes of ecclesiastical government, the normal territorial distribution of the R. C. Church of the several rites in the various countries where it exists is into provinces, which are subject to archbishops, and are subdivided into bishoprics, each governed by its own bishop. The total number of archbishops of the several rites in communion with Rome in 1863 was 158, of whom 12 bear the title of patriarch. The number of bishops in the same year was 694, making in all 852. But in certain parts of the world, where the population and government are Protestant or unbelieving, the spiritual affairs of the Catholic Church are directed, not by bishops with local titles, but by bishops IN PARTIBUS INFIDELIUM (q. v.), who are styled vicars of the pope, or vicars apostolic. Of these, the number in 1863 was 125.

The statistics of the R. C. Church, as contained in the *Orbe Cattolico*, published at Rome, give us the total number of Catholics of all nations as 185,000,000. This number nearly corresponds with the total of Roman Catholics as given in the article on Religion (q. v.). In order to avoid unnecessary repetition, we refer to that article for the details of the distribution of Roman Catholics in the several countries; and for the number of those subjects of the pope who follow a rite different from that of

Rome, see Greek Church, Russian Church, Syria, Maronites.

ROMAN CATHOLIC EMANCIPATION or **RELIEF ACTS.** After the Reformation, both in England and in Scotland, R. Catholics were subjected to many penal regulations and restrictions. As late as 1780, the law of England—which, however, was not always rigidly enforced—made it felony in a foreign R. Catholic priest, and high treason in one who was a native of the kingdom to teach the doctrines or perform divine service according to the rites of his church. R. Catholics were debarred from acquiring land by purchase. Persons educated abroad in the R. Catholic faith were declared incapable of succeeding to real property, and their estates were forfeited to the next Protestant heir. A son or other nearest relation being a Protestant, was empowered to take possession of the estate of his R. Catholic father or other kinsman during his life. A R. Catholic was disqualified from undertaking the guardianship even of R. Catholic children. R. Catholics were excluded from the legal profession, and it was presumed that a Protestant lawyer who married a R. Catholic had adopted the faith of his wife. It was a capital offence for a R. Catholic priest to celebrate a marriage between a Protestant and R. Catholic. Such was the state of the law, not only in England but in Ireland, where the large majority of the population adhered to the old faith. In Scotland, also, R. Catholics were prohibited from purchasing or taking by succession landed property. The inexpediency and irrationality of imposing fetters of this description on persons not suspected of disloyalty, and from whom danger was no longer apprehended, began about 1778 to occupy the attention of liberal-minded statesmen; and in 1780, Sir George Saville introduced a bill for the repeal of some of the most severe disqualifications in the case of such R. Catholics as would submit to a proposed test. This test included an oath of allegiance to the sovereign, and abjuration of the Pretender, a declaration of disbelief in the several doctrines, that it is lawful to put individuals to death on pretence of their being heretics; that no faith is to be kept with heretics; that princes excommunicated may be deposed or put to death; and that the pope is entitled to any temporal jurisdiction within the realm. The bill, from the operation of which Scotland was exempted, eventually passed into law. An attempt which had been made at the same time to obtain a like measure of relief for the R. Catholics of Scotland, was defeated by an outburst of religious fanaticism. The populace of Edinburgh, stirred up by a body called 'The Committee for the Protestant Interest,' attacked and set fire to the R. Catholic churches, and the houses of the clergy and of such persons as were suspected to be favourable to R. Catholic relief. The frenzy spread to England, where a 'Protestant Association' had been formed to oppose the resolutions of the legislature. See Gordon, Lord George. In 1791, a bill was passed affording further relief to such R. Catholics as would sign a protest against the temporal power of the pope, and his authority to release from civil obligations; and in the following year, by the statute 33 Geo. III. c. 44, the most highly penal of the restrictions bearing on the Scottish R. Catholics were removed without opposition, a form of oath and declaration being prescribed, on taking which they could freely purchase or inherit landed property.

Endeavours were made at the same time by the Irish parliament to get rid of the more important disqualifications, and place Ireland on an equality in point of religious freedom with England. In 1780, Grattan carried his resolution that the king and parliament of Ireland could alone make laws that would bind the Irish, and separation from England was urged as the alternative with repeal of the disqualifying statutes. The agitation culminated in the Irish rebellion of 1798; the union of 1800 followed, which was partly carried by means of pledges, not redeemed, regarding the removal of the disabilities in question. Meantime, in England, R. Catholics continued subject to many minor disabilities, which the above-mentioned acts failed to remove. They were excluded from sitting and voting in parliament, and from enjoying numerous offices, franchises, and civil rights, by the requirement of signing a declaration against transubstantiation, the invocation of saints, and the sacrifice of the mass. In the early part of this century, many measures were proposed for the removal of these disqualifications, and in 1813 and succeeding years, one bill for this end after another was thrown out. Meanwhile, the agitation on the subject among the R. Catholics themselves greatly increased, and in 1824 it assumed an organised shape by the formation of the 'R. Catholic Association' in Ireland, with its systematic collections for the 'Catholic rent.' The Duke of Wellington, who, for a long time, felt great repugnance to admit the R. Catholic claims, was at last brought to the conviction, that the security of the empire would be imperilled by further resisting them, and in 1829 a measure was introduced by the duke's ministry for Catholic emancipation. An act having been first passed for the suppression of the R. Catholic Association—which had already voted its own dissolution—the celebrated R. Catholic Relief Bill was introduced by Mr Peel in the House of Commons on the 5th of March, and after passing both Houses, received the royal assent on the 13th April. By this act (10 Geo. IV. c. 7), an oath is substituted for the oaths of allegiance, supremacy, and abjuration, on taking which R. Catholics may sit or vote in either House of Parliament, and be admitted to most other offices from which they were before excluded. They, however, continue to be excluded from the offices of Guardian and Justice or Regent of the United Kingdom, Lord Chancellor, Lord Keeper, or Lord Commissioner of the Great Seal of Great Britain or Ireland, and Lord High Commissioner to the General Assembly of the Church of Scotland. As members of corporations, they cannot vote in the disposal of church property or patronage. Ecclesiastics or other members of the R. Catholic persuasion, either wearing the habit of their order, or officiating in any place which is not their usual place of worship, or a private house, forfeit £50. Jesuits, and members of orders bound by monastic or religious vows, must register themselves with the clerk of the peace of their county, under a penalty of £50 for every month that they remain in the kingdom unregistered. Jesuits not natural-born subjects, who have come into the country since the passing of the act, are liable to be banished. Persons admitting others to such societies within the United Kingdom, are liable to fine and imprisonment, and those who have been so admitted are liable to be banished.

Restrictions which existed on R. Catholic bequests were removed by 2 and 3 Will. IV. c. 115, as regards Great Britain, and by 7 and 8 Vict. c. 60, with relation to Ireland. Acts 7 and 8 Vict. c. 102, and 9 and 10 Vict. c. 59, abolished a few minor R. Catholic disabilities. For the statutory prohibition against the assumption of ecclesiastical titles in respect of places in the United Kingdom, see Ecclesiastical Titles Assumption Act.

ROMAN CEMENT. See Cements.

ROMAN RELIGION, ANCIENT, a conglomeration of the most widely-different theological or, rather mythological elements, introduced by the various strata of immigrations that flowed into the different parts of Italy at different pre-historic times. It was chiefly under Greek influence that it assumed that most characteristic and systematic form, under which it was known during the classical times of Rome, and as which it generally represents itself to our minds. Numa Pompilius (q. v.), that mythic successor of Romulus, is by the primitive legend mentioned as the founder of the Roman religion, or rather ceremonial law. He is probably the type of the period when the religious notions of the Sabines were first joined to the primitive elements of legendary belief of the early settlers. Among the vast number of the different and obscure component elements, the Pelasgian, Sabellian, Oscan, Gallic, &c., out of which grew the recognised state religion, we can, with a comparative amount of clearness, distinguish chiefly three—the Etruscan, the Sabine, and the Latin. The religion of the Etruscans—as distinct from the Pelasgians (q. v.)—has been characterised in our article on that nation. Of the gods of the Latins, many are closely related to those of the Greeks (see GREEK RELIGION), a circumstance easily accounted for by their common eastern origin (see ROME, HISTORY OF); others, however, seem indigenous. Their principal deities are Tellus (q. v.) (the earth) Saturn (q. v.) (god of seeds), and his wife Ops (goddess of earth and plenty), who are somewhat akin to Kronos and Rhea; Jupiter (q. v.), with Juno (q. v.), givers of light. Deities more peculiar to the Latins are Janus (q. v.), and Diana (q. v.). Faunus and Fauna are prophesying wood-deities, and were allied to Lupercus, in whose honour the Lupercalia (q. v.) were celebrated; Picus and Pilumnus, who preside in some way over agriculture and the fruits of the field; Vesta (q. v.); Fortuna (q. v.); Ferentina, the goddess of leagues. A certain number of agrarian deities (Anna Perenna, Venus, &c.) make up, with those mentioned, the bulk of 'native' Latin numina. Of chiefly Sabine deities, we name Feronia, the Ferentina of the Latins, a goddess of the soil, who was worshipped with gifts of flowers and fruits; and the two war-gods, Mars and Quirinus the former a deity at first worshipped under the symbol of shield and spear, and of high importance for colonisations, to whom every animal and every human being born in a certain year was sacred; the former being doomed to be sacrificed, and the latter at the age of twenty to emigrate, and to found new settlements: Quirinus, a deity of strife, closely connected with the myth of Romulus. Sabine deities were also Sol, the sun, Luna, the moon, &c.

Having thus traced some of the principal gods and goddesses (of the greater part of whom fuller information will be found in special articles in the course of this work) to the respective nationality that first introduced them into Italy, we shall now take a brief glance at the Roman Pantheon as it appeared when it had embodied systematically these acclimatised primeval idealisations. For it was as characteristic of the Roman gods to appear in sets, as it was for the more personal gods of the Hellenes to appear singly. The Romans, as it were, made them fall rationally into rank and file, each with a distinct mission of its own, and thus filled with them, as with authorities over special departments, the whole visible and invisible world above, below, and around. The first rank of all is taken by the three Capitoline deities, the personifications of highest power, highest womanliness, and highest wisdom—Jupiter (q. v.); Juno (q. v.), the Queen of Heaven, and the tutelary deity of women; and Minerva (q. v.). The stars also had three foremost representatives—Sol, the sun, Luna, the moon, and Tellus, the earth. The supreme deities of the Infernal Regions were Orcus, Dis (Dives, Consus?), and his wife, the Queen of the Empire of the Shadows, Libitina. The element of the water was presided over by Neptune (q. v.); that of the fire by Vulcan (q. v.), the god of the smithies, and Vesta, the goddess of the domestic hearth and its pure flame. Agriculture and rearing cattle were sacred to the ancient Latin king Saturnus, whose wife, Ops—the riches therefrom accruing—had, like Demeter, her seat in the soil. Ceres, Liber, and Libera, the three Greek deities of agricultural pursuits, were superadded about 500 B. C. Pales, the special protector of the flocks, and his festival (the Palilia) were celebrated on the foundation-day of Rome. Mars himself was the supreme deity of the Romans next to Jupiter. Deities of Oracles are Faunus, a deified king, who gave his obscure decisions either in dreams or in strange voices, and his female relative—wife, daughter, or sister—Fauna (Bona Dea), who attends only to the female sex; and the Camenæ, prophesying nymphs, of whose number was Egeria, Numa Pompilius's inspirer. The Apollo worship was but of late growth in Rome. The Parcæ represented the unchangeable fate of the individual. Fortuna was, on the contrary, the uncertain chance of destiny, the 'luck' to be invoked at all important junctures. Salus, Pax, Concordia, Libertas, Felicitas, Pietas, Virtus, Honos, Spes, and a host of other abstract notions, explain themselves. Venus first became important when identified with Aphrodite; in the same way as Amor, Cupido, and Voluptas were Greek importations, brought into prominence by the poets chiefly. Life, death, and life after death are made concrete, by the Genii, the Lares, Manes, and Penates. See LARES.

Like the Greeks, the early Romans had no 'mediators,' but addressed their prayers and supplications directly to the individual god. The priesthood, we find, in the classical period, had arisen originally from the 'kindlers' (*flamines*) of Mars,' or those who presented burnt-offerings to the early Italian war-god Mars, and the twelve dancers (*Salii*) who in March performed war-dances in his honour. To these came the 'Field Brethren,' the 'Wolf-repellers,' &c.; and thus by degrees an endless and most powerful hierarchy came to be built up. By the side of it, but not identical with it, were certain sacred colleges, who kept the sacred traditions alive, and who were the supreme authority on religious observances. These were the colleges of Pontifices (q. v.) or Bridge-builders, of Augurs (see AUGURIES and AUSPICES), the keepers of the Sibylline Books (see SIBYL); the twenty Fetiales or state heralds, the supreme—advising, not executing—authorities on international law; the Vestal virgins, on whom devolved the guardianship of the Palladium and of the sacred fire; the Salii (see above), and others. Priests, in the stricter sense of the word, in the service of special deities, were the Flamens (q. v.); while the Dea Dia, the goddess of fields (Tellus, Ceres, Ops, Flora), had the special brotherhood of the twelve Arvalian brothers, with their numerous followers. The state sacrifice, before the expulsion of the mythical kings supposed to have been offered up by these, was offered by a special *Rex Sacrorum* or *Rex Sacrificulus*.

The mode of worship was analogous to that of the Greeks. Votive offerings, prayers, vows, sacrifices, libations, purifications, banquets, lays, songs, dances, and games made up the sum of their divine service. The sacred places were either *fana, delubra*—mere hallowed spots on hills and in groves—or *templa*,

ædes, special buildings dedicated to a special deity. The latter contained two altars—the *ara*, for libations and oblations; and the *altare*, for burnt-offerings chiefly. Frugality, as it pervaded, in the classical period, the domestic life, so it also prevented all extravagance of offerings to the deity, and all excess of rejoicing before it. Sober and dull, as the Roman religion undoubtedly was—for it never once expanded into the joyful extravagances of fancy with which the Greek religion was fraught throughout—it at the same time kept free from the abominations that are the natural offspring of that unbounded sway of fancy. Human sacrifices, as far as they are to be met with, grew out of the idea of substitution, and were chiefly enthusiastic voluntary acts of men who threw themselves into the breach; or they carried out decrees of civil tribunals, who had convicted the 'victim' of a deadly offence. In their dealings with the gods, the Romans were pure merchants, carrying out their promises with strict literalness, and thus often fraudulently, against the patent inner meaning of their promise; but the gods were not to them the all-pervading essences, but rather creditors, strict and powerful, yet unable to exact more than was agreed upon outwardly.

A code of moral and ethical rules, furthering and preserving civil order, and the pious relations within the state and family, were the palpable results of this religion, which, in its barrenness of metaphysical notions, did next to nothing for the furtherance of art.

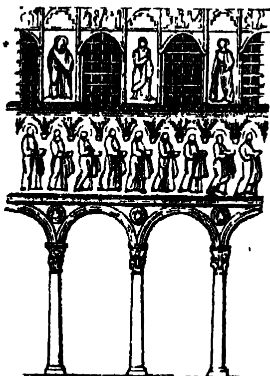
And here we must enter somewhat more fully into that peculiar phenomenon of the utter dissimilarity in the characters of the Greek and Roman religion, at which we have hinted already—a dissimilarity all the more surprising, as the selfsame symbolical and allegorical views of nature, filtered through however different channels, form the foundation of both. Both also—especially in their later stages—offer a general analogy not only of deities and spirits, but even of holy places and their mode of worship. But the fact is, that they each took the originally common stock of notions and conceptions, clad more or less in mythical garb, and utterly transformed it, superadding to it from time to time according to their own distinct nationality. It is here, however, that their characteristic traits come out in as forcible a contrast as they do in every other relation of life, in their art and culture, in their states and families. While to the Hellenes the individual was the chief end of all things, and the state existed for the citizen, and the ideal was the *Kalokagathia*, the beautiful, good, the Romans imposed, as the highest duty, submission to authority—the son to the father, the citizen to the ruler, and all to the gods. To them, only that which was useful appeared good. Idleness was not to be tolerated in a community where every single member only existed as far as it contributed to the greatness and aggrandisement of the commonwealth. Hence, with them, a rational thoughtfulness, and a grand and awful austerity in their relations to men and gods; while the Greeks treated both with joyful serenity. The Greek invested his gods with human attributes, and then surrounded them with a halo of highest splendour and most glorious divine beauty; but he constantly modelled and remodelled them, until they reached the acme of beautiful perfection, as would the painter and the sculptor with their work. The Roman, on the other hand, cared nothing for the outward form of his idealised notions—the notions themselves, mere fundamental ideas, were his sole object of veneration. The Greeks made everything concrete, corporeal, and individual; the Romans, abstract and general. The Greeks could only worship allegories; the Romans, abstractions. Hence, also, their utter discarding of many of the myths common to the whole Indo-Germanic stock, the unmarried and childless state of their gods, who, moreover, wanted no food, and did not wander about among men, as did the Indian and the Hellenic. As in the late Midrash, which has partly found its way into Christianity, there is a heavenly Jerusalem right over the earthly Jerusalem, in which all things below were reproduced in an exact but most ideal and divine manner. Thus, the Roman Pantheon was the precise counterpart of the Roman world as it existed in reality. Every man, and thing, and event, and act had a corresponding tutelary deity, that came and went with the special individual, phenomenon, or event, and eternal gods were those only that represented certain great unchanging laws of nature. The angels of the legendary lore of later Judaism and early Christianity, that protect special nations, were with the Romans the gods of these nations, and entered, as their special numina, the divine commonwealth of the Romans simultaneously with the admission of these nations into their own pale or freedom.

As long as the grand old Roman simplicity of manners, the frugality of domestic life, the indefatigable pursuit of agriculture, trade, and commerce lasted—and all of these were well characterised by the deep reverence paid to gods (albeit not in the highest scale of divine order), who presided over the house, the field, the forest, mercantile enterprise, and the like, Vesta, the Penates, the Silvani, the Lares or Lases, Hercules or Herculus (a native Italian deity, the god of the enclosed homestead [compare Jupiter *herceus*] apparently distinct from the Greek Heracles) as the god of property and gain, whose altar, as god of faith (*Deus fidius*), was as frequently to be met with as those of the goddess of chance (Fors, Fortuna), and the god of traffic (Mercury)—so long did Roman religion, properly so called, retain its firm hold over the people's minds, and its influence cannot well be overrated. But when the antique austerity, the olden spirit of grand independence, the unceasing hard work that steeled body and soul, had given way to the lazy luxurious ease of later times—then Roman religion ceased to exist in reality, and over its ruins rose a mad jumble of unbelief, Hellenism, sectarianism, and oriental creeds. The ancient *religio*, the binding faith, which had excited the admiration and astonishment of the Greeks, had waned, and in proportion with the unbelief rose the pomp, and stateliness, and luxury of public worship. To the hierarchy of augurs, oracle-keepers, and pontifices were superadded special banquet-masters for the divine banquets. The priests more and more freed themselves from taxes and other public burdens, and the custom of perpetual endowments for religious objects crept in, as their influence waxed stronger and stronger. 'Pious services' became as much an item of domestic expenditure as the cook's and nurse's wages. Penny collections for the 'mother of God' were gathered on certain fixed days by the sound of fife and drum played by priests in oriental garb, headed by a eunuch, from house to house, and the whole substance of Roman faith was transformed into an unwieldy mass of dark, grovelling mysticism and shameless profligacy, presided over by wretched gangs of uneducated and unprincipled priests. How this state of things favoured the gradual introduction of Judaism and Christianity into the dying days of imperial Rome, has been briefly sketched in GNOSTICS (q. v.). Constantine the Great abolished the last outward trace of Roman religion by proclaiming Christianity as the state religion.—For the greater

part of the gods and goddesses mentioned, see special articles. See also GREEK RELIGION, ETRURIA, PELASGIANS, &c. For a fuller account of the whole subject, the reader is referred to Mommsen's *History of Rome* (Eng. transl. Lond. 1864).

ROMANE'SQUE ARCHITECTURE, the debased style which succeeded Roman architecture, from about the time of Constantine (350 A.D.) to that of Charlemagne (800 A.D.). It is impossible to fix the date of the style definitely, because Roman Architecture (q. v.) was itself a transitional style, and the one fades gradually into the other. When Constantine proclaimed Christianity the religion of the empire, he gave the Christians freedom of action. They could worship in public, and consequently desired buildings for their service; hence the impetus which gave architecture a new start. As explained under APSE and BASILICA, the Christians adopted the Roman hall of justice for their church or place of assembly, and erected many noble basilicas in Rome, Ravenna, and all over the empire. These consisted of three or five aisled halls—the aisles separated by rows of columns. In Rome, the columns, entablatures, and other ornaments were frequently taken from the ruins of ancient buildings which abounded there. The new style is therefore closely allied to the ancient one in the imperial city; but in Ravenna, Jerusalem, Provence, and the remoter districts, where few ancient remains exist, a simpler and ruder copy of the ancient work is found. There is always, however, a certain resemblance to the old forms which distinguishes the Romanesque from the round-arched Gothic which succeeded it. The piers along the aisles are always single columns, generally with caps intended to be Corinthian, and wide arches; the aisles are wide, with open wooden roof; and there are remnants of entablatures, mouldings, &c., which recall the ancient Roman work. The early Christians also derived their round churches from the Romans. They were probably originally tombs, copied from such buildings as the Minerva Medica (see ROMAN ARCHITECTURE), and were the most sacred places, where the burial-service was said, and the sacraments administered. Hence they afterwards became Baptisteries (q. v.), and were finally absorbed into the church (see RHENISH ARCHITECTURE), which then contained within itself everything connected with the Christian service.

In Rome there are still some thirty basilicas, and



Romanesque Interior.

the Romanesque style may be said never to have died out there. As we recede from the centre, we find its influence gradually weaken, and succumb to the Northern Gothic style. Thus, in Lombardy and Provence, it was superseded by the Lombard (q. v.) and Romance styles in the 11th and 12th centuries; while in Byzantium and the East, it gave way to the Byzantian style about the time of Justinian. Amongst the finest examples remaining are St Paul's (see BASILICA) and Sta Maria Maggiore at Rome, and at Ravenna, St Apollinare; the interior decoration of which last (see fig.) is very beautiful. The mosaics of the apse, the painted walls, and the inlaid pavements of the Romanesque churches, are amongst their finest features. In colour, they always excel.

In Tuscany, there is a late form of Romanesque, of which the cathedrals at Pisa and Lucca, San Miniato at Florence, and many churches in those cities, are examples. They are intermediate specimens, built during the 11th c., when the cities became prosperous, and have a certain amount of Gothic feeling; but although beautiful in coloured decoration, they have not the simple grandeur of the early basilicas; and although more decorated externally than these, they have not the bold and purpose-like appearance of Gothic elevations.

ROMA'NIC LANGUAGES, a general name for those modern languages that are the immediate descendants of the language of ancient Rome. In those parts of the empire in which the Roman dominion and civil institutions had been most completely established, the native languages were speedily and completely supplanted by that of the conquerors—the Latin. This was the case in Italy itself, in the Spanish peninsula, in Gaul or France, including parts of Switzerland, and in Dacia (see WALACHIAN LANGUAGE). When the Roman empire was broken up by the irruptions of the northern nations (in the 5th and 6th centuries), the intruding tribes stood to the Romanised inhabitants in the relation of a ruling caste to a subject population. The dominant Germans continued for several centuries to use their native tongue among themselves; but from the first they seem to have acknowledged the supremacy of the Latin for civil and ecclesiastical purposes, and at last the language of the rulers was merged in that of their subjects; not, however, without leaving decided traces of the struggle traces chiefly visible in the intrusion of numerous German words, and in the mutilation of the grammatical forms or inflections of the ancient Latin, and the substitution therefor of prepositions and auxiliary verbs. It is also to be borne in mind that the language which underwent this change was not the classical Latin of literature, but a popular Roman language (*Lingua Romana rustica*) which had been used by the side of the classical, and differed from it—not to the extent of being radically and grammatically another tongue, as some writers unwarrantably conclude - but chiefly by slovenly pronunciation, the neglect or misuse of grammatical forms, and the use of 'low' and unusual words and idioms. As distinguished from the old *lingua Latina*, the language of the church, the school, and the law, this newly-formed language of ordinary intercourse, in its various dialects, was known as the *Lingua Romana*; and from this name, probably through the adverb Romanicé, came the term Romance (Prov. and O. Fr. *romans*, Sp. *romance*, It. *romanzo*), applied both to the language and to the popular poetry written in it, more especially to the dialect and productions of the troubadours in the south of France.

According to the theory of Raynouard (q. v.), the new language that sprang out of the corruption of the Latin was at first essentially the same over all the countries in which Latin had been spoken, and is preserved to us in a pure state in the Provençal, or language of the troubadours; and it was from this as a common ground, and not from the original

Latin, that the several Neo-Latin tongues diverged into the different forms which they now present. This theory is not accepted by more recent inquirers; its groundlessness has been demonstrated by Sir G. Cornewall Lewis in his elaborate *Essay on the Origin and Formation of the Romance Languages* (2d ed. Lond. 1862). It is beyond doubt that the several daughters of the mother Latin had their characteristic differences from the very first, as, indeed, was inevitable. The original Latin spoken in the several provinces of the Roman empire must have had very different degrees of purity, and the corruptions in one region must have differed from those in another according to the nature of the superseded tongues. To these differences in the fundamental Latin must be added those of the superadded German element, consisting chiefly in the variety of dialects spoken by the invading nations and the different proportions of the conquering population to the conquered. French, e. g., as was to be expected, is richer in German words than any other member of the family, having 450 not found in the others. Italian is next to French in this respect. There are about 900 in the Romanic languages altogether, of which about 300 are common to them all. A great many of these words are terms relating to warfare.

The varieties of speech originating in the way now described (which first received the general name of Romanic* languages in recent times from German scholars—*Romanische Sprachen*) are divided by Diez into six jurisdictions:

1. The Italian, preserving, as was to be expected, the traits of the mother Latin in more recognisable form than any of the sister tongues. It presents a variety of strongly marked dialects.

2. The Walachian (see WALACHIAN LANGUAGE).

3. The Spanish, which is characterised by copiousness and etymological obscurity, arising from the establishment of so many different nations on the soil. For one element of difference, it contains a large number of Arabic words—as many as 500 terms have been enumerated. Of the various dialects, the Castilian is considered the standard.

4. The Portuguese, including both the language of Portugal and of Galicia; it is nearly akin to the Spanish, but differs too much in some points of grammar to be reckoned a mere dialect.

5. Provençal, the language of the south of France, extending on the one side into Spain over Catalonia, Valencia, and the Balearic Isles; and on the other over Savoy and part of Switzerland, about the Lake of Geneva. The line of division between the Provençal and the northern idiom which has now become the literary language of the whole of France, is usually drawn through Dauphiné, Lyonnais, Auvergne, Limousin, Perigord, and Saintonge. From the use of the affirmative *oc* (= yes), the Provençal was known as the Langue d'oc, as the northern French was called the Langue d'oil, from *oil*, modern French *oui* (see LANGUEDOC).† The Provençal was at an early period a cultivated language, with a regular system of grammar, and in the 12th and 13th centuries, produced a rich poetical literature (see TROUBADOURS).

6. French, extending over the northern half of France, and parts of Belgium and Switzerland. Diez conceives that at first northern French may have been little different from Provençal, but, beginning with the 9th c., it has been more and more distinguished by the greater wearing away of the original grammatical forms. See FRENCH LANGUAGE AND LITERATURE.

The language of the canton of the Grisons (q. v.), anciently *Rhætia*, though sufficiently distinct from Italian and French, is not considered by Diez to have attained sufficient fixity or independence to deserve being ranked along with the others as a seventh Romanic tongue. It is called by the Germans Cur-wälsch, by the people themselves Rumonsh. There are two chief dialects, the Oberland, about the sources of the Rhine, and that spoken in the Engadine (q. v.), called the Ladin.

The chief authorities on this subject are the two great works of Diez (q. v.), the Grammar and the Dictionary of the Romanic Languages. The Dictionary and the Introduction to the Grammar have been translated into English.

ROMANOFF, THE HOUSE OF, of which the present imperial family of Russia is the chief representative, is said to have derived its origin from a Lithuanian prince of the 4th c.; but however this may be, it is certain that the family did not make its appearance in Russia till the 14th c., when Andrew Kobyla emigrated from Prussia to Moscow in 1341, and entered the service of the then grand-duke, Simeon the Fierce. Andrew's descendants became bojars early in the 15th c., their territorities lying in the government of Vladimir, and district of Jurief-Polskoi. The bojar *Roman Jurievitch*, the fifth in direct descent from Andrew, died in 1543, leaving a son and daughter; the latter of whom became czarina by her marriage with Ivan the Terrible; while the former, *Nikita Romanovitch Jurief*, by his nuptials with the Princess of Susdal (a direct descendant from a brother of St Alexander Nevskoi), was also allied to the royal race of Rurik. Nikita was one of the regency during the minority of Feodor I.; and his eldest son Feodor, under the name of *Philarete*, was elevated to the rank of archimandrite and metropolitan of Rostof during the reign of the false Dmitri. The Romanoffs supported that party who tendered the Russian crown to the Polish prince, and Philarete had gone with that view to Poland, when a sudden outburst of national sentiment put a stop to these negotiations, and the unlucky envoy was in consequence thrown into prison by the enraged Poles. The national party now proceeded to the election of a native sovereign, who should be as closely allied as possible by blood to the race of Rurik; and after much hesitation and many rejections, they chose MIKAIL FEODOROVITCH ROMANOFF, the son of the imprisoned metropolitan, and the representative, through his grandmother, of the royal house of Rurik, 21st February 1613. This selection, which had been made by the higher nobility and the clergy, was rapturously applauded by the people; and though the new czar was not quite seventeen years of age, the general desire of all classes to conform to his ordinances rendered the cares of government comparatively light. He was succeeded by his eldest son, *Alexei Mikailovitch* (1648—1676), an able prince, who carried on war with varied success against the Swedes and Poles, and acquired a great reputation as a legislator. Alexei was twice married, and left by his first wife two sons, Feodor and Ivan, and many daughters, and by his second wife, one son, Peter. His eldest son, *Feodor* (1676—1682), was a

* *Romanic* seems preferable to *Romance*, the term employed by many English writers, both as being more in analogy with *Italic*, *Arabic*, &c., and as avoiding the association with a particular kind of literature, and the special Neo-Latin tongue in which that literature was originally written—viz., the Provençal.

† Instead of the etymologies of *oc* and *oïl* given in the article referred to, Diez derives *oc* from Lat. *hoc*, this (equivalent to Eng. *so*, Ital. and Fr. *si*, which are only other forms of the Pronoun [q. v.] *sa* or *ta*); in the north, *oc* was first shortened into *o*, and then compounded with *il* (Lat. *hoc illud*).

prince of much talent and foresight, and laboured with success to reduce the power of the aristocracy; but being of a very weak constitution, he died at the age of twenty-five without posterity, leaving the throne by his will to his half-brother, Peter, as his full brother, Ivan, was an imbecile. However, it was not till seven years after this that *Peter* (see PETER THE GREAT) succeeded in obtaining possession of the throne. It is worthy of remark, that hitherto all the czars of the House of R. had mounted the throne before attaining twenty years of age. Peter (see PETER THE GREAT) was twice married; by his first marriage, he had a son, Alexis (q. v.), who died during his father's lifetime, leaving one son, Peter, afterwards Peter II.; and by his second marriage with *Catharine I.* (q. v.) (1725—1727) he had two daughters, Anne and Elizabeth. Catharine I. left the throne to her step-grandson, *Peter II.* (1727—1730), the last of the male line of R.; and on his death without heirs, the succession reverted to the female line. Ivan, Peter the Great's half-brother, had also left daughters, and their claims to the crown being preferable, one of them, *Anna Ivanovna* (1730—1740), was placed upon the throne, and was succeeded by her grand-nephew, *Ivan IV.* (1740 1741); but then a revolution drove Ivan's family from the throne, of which the cadet female line in the person of *Elizabeth* (1741—1761), the daughter of Peter the Great and Catharine, obtained possession. Failing heirs of Elizabeth, her nephew, Peter, the son of her elder sister, Anna Petrovna, who had married the Duke of Holstein-Gottorp (a cadet of the family of Oldenburg), and died in 1728, was the heir-presumptive; and accordingly, on her death in 1761, he mounted the throne as *Peter III.* (1761—1762), founding a new dynasty, that of ROMANOFF-OLDENBURG; but his brief tenure of power was put an end to by his assassination, at the instigation of his wife, the princess Sophia-Augusta of Anhalt-Zerbst, who, as Catharine II. (1762 - 1796), wielded the sceptre of this mighty empire for the long period of thirty-four years. She was succeeded by *Paul I.* (q. v.) (1796—1801), her only son by Peter III.; and Paul, after a brief reign, was also assassinated, leaving several sons, the eldest of whom was *Alexander I.* (1801—1825); but as he left no issue, the crown at his death devolved by right upon his next brother, Constantine. Constantine had, however, in compliance with the wish of his elder brother, previously relinquished his claims to the supreme power, and the third brother, *Nicholas I.* (1825—1855), in consequence ascended the throne. Nicholas left at his death four sons and several daughters, and his eldest son, *Alexander II.* (1855) is the present czar.

ROMANS, a town of France, in the dep. of Drome, stands on the right bank of the Isère, 14 miles north-east of Valence. A bridge, founded in the 9th c., connects R. with the small town of Peage on the left bank of the river. R. owes its origin to an important abbey, founded in the 9th c. by Saint Bernard, Archbishop of Vienne, and by a nobleman named Romain, who gave his name to the town. Silk and woollen fabrics are largely manufactured, and a very active general trade is carried on. Pop. (1862) 8418.

ROMANS, EPISTLE TO THE, in a doctrinal point of view, the most profound and elaborate composition of St Paul. That it proceeded from the pen of the great apostle of the Gentiles, has never been seriously doubted by any competent scholar. Much discussion has taken place regarding the *composition* of the church at Rome, and—connected therewith—the design or object of the epistle. Were the members of the church Jewish or Gentile Christians? The general opinion of commentators is, that the church was a mixed congregation, the majority of members being probably of pure Gentile descent, and the minority, Jewish Christians, who perhaps formed the original nucleus of the church. Dr Jowett, in his *Epistles of St Paul to the Romans, Galatians, and Thessalonians*, suggests that the phenomena of the text—for example, the frequent appeals to the authority of the 'law' addressed to Gentiles—may be best explained on the hypothesis that the apostle is speaking to a Gentile congregation which had passed through a phase of Jewish proselytism. The great value of the Epistle to the Romans consists in this, that it exhibits what may be called the *rationale* of Christianity. The immediate object of the apostle was probably nothing more than to prevent an outbreak in the church at Rome of those violent antipathies of religious sentiment which had shewn themselves elsewhere (for instance, at Corinth), and had produced such disastrous consequences; but with a view to the more complete accomplishment of this object, he takes a broad *ethical* view of human nature, and finds all men—Jews and Gentiles alike—to be estranged from God, and in need of pardon and reconciliation. He does not underrate the advantages which his Jewish countrymen possessed—nay, he extols them; but he points out at the same time that the 'oracles' or 'law' could not make the Jews holy: they could only condemn them for being unholy. The Gentiles were declared guilty not less decisively by their own consciences—the law was plainly enough 'written in their hearts.' Hence Paul's grand argument, that if men are to stand as 'righteous' in the sight of God, it cannot be by their 'works,' but in virtue of a divine justification graciously vouchsafed to them, and received into their hearts by an act of faith. This leads him to unfold the purpose and significance of Christ's work, to dilate on the 'freeness' of God's grace towards 'sinners.' He concludes by predicting the conversion of his 'kinsmen according to the flesh,' exhorting the Gentiles to humility, charity, mutual forbearance, and the practice of all the Christian virtues. The Epistle is believed to have been written from Corinth during Paul's third missionary journey, about 58 A. D. The commentaries upon it, or upon special chapters, are innumerable; and almost all the great doctrinal controversies that have agitated Christendom owe their origin to it.

ROMANTIC SCHOOL, the name first assumed in Germany, about the beginning of the present century, by a number of young poets and critics, A. W. and Fr. Schlegel, Novalis, Ludwig Tieck, Wackenroder, &c., who wished to indicate by the designation that they sought the essence of art and poetry in the wonderful and fantastic elements that pre-eminently characterised the Romance literature of the middle ages. Their efforts were directed to the overthrow of the artificial rhetoric and unimaginative pedantry of the French school of poetry, even then influential, and to the restoration of a belief in the mystery and wonder that envelop the existence of man—a belief that had been rudely assailed and mocked by the prevailing materialism in all departments of thought. Thus, their purpose was twofold—it was in part æsthetic, and in part religious. As poetical reformers, the Romantic School in Germany unquestionably exercised a most beneficial influence; but as religionists—though their aim was intrinsically high and noble—they more or less consciously subserved the designs of a reactionary government, and so came to be hated and distrusted by the liberal politicians and thinkers of Germany.—See Eichendorff's *Ueber die ethische und religiöse Bedeutung der neuern Romantischen*

ROMAN EMPIRE.

IN ITS GREATEST EXTENT.

OCEANUS GERMANICUS

HIBERNIA

BRITANNIA

Oceanus Britannicus

Oceanus Gallicus

Oceanus Cantabricus

GERMANIA

GALLIA

Aquitania

HISPANIA

MAURITANIA

NUMIDIA

MEDITERRANEUM MARE

Mare Suevicum

SARMATIA EUROPEA

SARMATIA ASIATICA

DACIA

MOESIA

THRACIA

PONTUS EUXINUS

ARMENIA

CAPPADOCIA

SYRIA

MESOPOTAMIA

Babylon

ARABIA

Arabicus Sinus

Mare Caspium

Syrtis Major

Creta

Marmarica

CYRENAICA

Libya Deserta

Thebae

Tropic of Cancer

Tropic of Cancer

Longitude East of Greenwich

W. & R. CHAMBERS, LONDON & EDINBURGH

Poesie (Leip. 1847); H. Heine's *Zur Geschichte der neuern schönen Literatur in Deutschland* (Hamb. 1833); and Hettner's *Die Romantische Schule in ihrem innern Zusammenhang mit Goethe und Schiller* (Bruns. 1850.)—Between twenty and thirty years later, a similar school arose in France, and had a long struggle for supremacy with the older Classic School. It was victorious, but not wise, and, except in a few instances—such as Lamartine and Victor Hugo—it has rushed into excesses of caprice both literary and moral, which have stamped it with a revolutionary rather than a reformatory character. —See Huber's *Die Romantische Poesie in Frankreich* (1832): Michiel's *Histoire des Idées Littéraires* (2 vols., Par. 1841); and Tenint's *Prosodie de l'École Moderne* (Par. 1844.)

ROME. The design of this article is to furnish the reader with a brief outline of the ETHNOLOGY and HISTORY of ancient Italy, in so far as these are not already discussed or described under particular heads, to which reference will be made. As the Roman state gradually conquered and incorporated with itself the other states and territories of the Italian peninsula, and as these (in general) figure separately in history only during the process of this subjugation, it will be most convenient to consider them here.

Ethnology.—In the earliest times we find in Italy *five* distinct races; three of which (IAPYGIANS, ETRUSCANS, and ITALIANS) may, in a restricted sense, be termed 'native,' inasmuch as we do not meet with them elsewhere; and two, GREEKS and GAULS, 'foreign;' inasmuch as their chief settlements were not in Italy, but in Greece and Gallia. But, ethnologically, this distinction is arbitrary. There is no reason for believing that the first three races were indigenous, and the last two, immigrant; the analysis of their languages, or of such fragments of their languages as survive, leads strongly to the conclusion that all were alike immigrant, and that in this respect the only difference between them is one of *time*.—1. *The Iapygians.* This race, monuments of which in a peculiar language (as yet undeciphered), have been found in the south-east corner of Italy—the Messapian or Calabrian peninsula—is in all probability the oldest.—2. *Etruscans.*—The origin of this mysterious people is certainly one of the most interesting, if also one of the most insoluble problems in history. It is not, however, necessary to say anything about them here, as their history, character, and civilisation are handled at length in the article ETRURIA. —3. *Italians.* At what period the earliest immigrations into Italy of the so-called 'Italian' races—the Latins and Umbro-Sabellians, took place, it is wholly impossible to tell; but it was undoubtedly long before the Etruscans had settled in Etruria. They were by far the most important of the various races that inhabited the peninsula; in fact, the entire historical significance of Italy depends upon them; and therefore it is fortunate that their ethnological origin and affinities are capable of the most certain demonstration. An investigation of their language, subdivided indeed into numerous dialects, often widely differing but fundamentally the same, has resulted in the discovery that they belong to the great Aryan or Indo-Germanic family (see ARYAN RACE and ARYAN LANGUAGES), and are in particular closely allied to the Hellenes. We are therefore warranted in affirming that at some very remote period a race migrated from the East, embracing the ancestors of both Greeks and Italians. By what route they proceeded, or at what point they diverged, we can only conjecture, for the problem is not yet solved whether the Hellenes reached Greece by way of Asia Minor or from the regions of the Danube; but, at any rate, Mommsen's statement that 'the Italians, like the Indians, immigrated into their peninsula from the north,' may be regarded as certain. There is ground for believing that the Latins were the first members of the Italian family to enter Italy, and that having crossed the Apennines, they spread themselves to the south along the western coast, driving the Iapygians before them, and finally cooping them up in the Calabrian peninsula—the heel of the boot. But this conquest belongs to prehistoric ages, and the original Latins of Campania, Lucania, Bruttium,* perhaps even Sicily (i. e., the races spoken of in classic legend, as the Itali, from whom the peninsula received its name, the Morgetes, Ausones, Siculi, &c.), were themselves in the course of time so thoroughly Hellenised by the influence of the rich and powerful Greek colonies planted on their coasts (see MAGNA GRÆCIA), or so overwhelmed by the successive invasions of Samnite hordes, that nearly every trace of a primitive Latin nationality has disappeared, and only here and there a solitary linguistic or legendary relic survives to indicate faintly the path which conjecture should pursue. It was only in Latium Proper, where no Greek colonies were founded, and where the fortune of war was in its favour, that the Latin branch of the Italian race firmly rooted itself. There, however, it did flourish, and petty as the district might seem—not more in all than 700 square miles—it was incomparably the most important in the peninsula, for within its limits rose those seven hills on which a city was to be built that was destined to subdue and govern the world. The other branch of the 'Italian' stock—the Umbro-Sabellian, must have entered Italy at a later period than the Latin. Its advance along the central mountain-ridge—the Apennines—from north to south can still be traced; and its last phases—i.e., the conquest of Campania and the other southern districts of the peninsula by the Samnite highlanders—belong to purely historical times. The oldest members of this branch are probably the Sabines (q. v.), who seem to have fixed themselves in the mountainous region to the north-east of Rome, and are regarded as the progenitors of that multitude of tribes which we find occupying the central portion of Italy—the Picentes, Peligni, Marsi, Æqui, Vestini, Marrucini, Frentani, Samnites perhaps also the Volsci and Hernici.—4. *Gauls.*—To a period considerably later and comparatively historical, belong the settlement of the Gauls in the north, and of the Greeks in the south of Italy. The former, a branch of the Celtic race, itself now ascertained to be also a member of the great Aryan family (see CELTIC NATIONS), and therefore allied, however distantly, to the other Italian races, had for ages before history begins fixed themselves in the region now known as France. Finding further progress westward barred by the waves of the Atlantic, and being of a restless and excitable disposition, they turned their steps east and south-east, broke over the Alps (according to the legend in Livy, by the Little St Bernard) some time during the 3d c. after the founding of Rome, and poured down into the plains of the Po. The first Gallic tribe that made its appearance on the soil of the peninsula is said to have been the Insubres, whose capital was Mediolanum (Milan); then followed the Cenomani, whose headquarters were Brixia (Brescia) and Verona, and afterwards numerous kindred hordes, among the latest and most powerful of whom were the Boii (q. v.) and Senones, who forced their

* The name 'Bruttium' given to the country of the Bruttii by modern writers on classical geography, is not found in any ancient author.

way across the Po, and effected a lodgment in the modern Romagna, occupying (besides an inland district) the coast of the Adriatic as far south as Ancona. Hence, in ancient times, the whole of Northern Italy was for a long period known as Gallia Cisalpina (Gaul on *this*, i. e., the Italian side of the Alps), to distinguish it from Gaul Proper, which was called Gallia Transalpina. Gallia Cisalpina was again subdivided into two parts by the river Padus (Po); the northern being named Gallia Transpadana, and the southern (the country of the Boii and the Senones), Gallia Cispadana. Various other tribes or peoples are found in the north of Italy, such as the Ligurians (along the Gulf of Genoa) and the Veneti (in modern Venetia), regarding whose origin—in the absence of all linguistic and other memorials—we are utterly in the dark. 5. *Greeks.*—The other people which we have distinguished as 'foreign,' was the Greek. There is, however, this distinction to be observed, that the Greeks were not (like the Gauls) barbarians; they did not swoop down upon the southern shores of Italy (like the Norse pirates on the coasts of England and France) to plunder and devastate; nor did they force their way into the interior and dispossess the native inhabitants; they merely colonised the coasts, built cities, and carried on commerce. Through them it is probable the Romans acquired their earliest notions of the Greek literature, philosophy, and cultus. For further information concerning them, we refer the reader to the article MAGNA GRÆCIA, and to such of their cities as have received separate treatment.

Primitive Social Condition of the Latins.—With this brief introductory sketch of the various races that inhabited Italy in historical or pre-historical times, we may now revert to the Latins, with whom we have at present more particularly to do. What was the extent of their civilisation, or how far their social organisation had proceeded when they finally settled in the 'broad plain' (*Lătium*, connected probably with *lătus*, broad; *lătus*, a side; Gr. *platus;* Eng. *flat*) that stretches westward from the Alban Hills to the sea, may be conjectured, but cannot be positively ascertained. We know, indeed, that long before they had set foot in Italy, before even they had branched off from their Hellenic brethren, they had ceased to be *mere* nomades, or wandering shepherds. The evidence of this fact lies in their language. Not only do the names of the oldest Latin nations, as the *siculi*, ('the sickle-bearers' or 'reapers'), and the *osci, or opsci* ('field-labourers'), clearly prove the antiquity of Italian husbandry; but the oldest agricultural terms are actually common to both Latins and Greeks (e. g., Lat. *ager*, Gr. *agros;* Lat. *aro, aratrum*, Gr. *aroō, arotron;* Lat. *ligo* (a hoe), Gr. *lachaino;* Lat. *hortus*, Gr. *chortos;* Lat. *milium*, Gr. *melinē;* Lat. *rapa*, Gr. *raphanis;* Lat. *malva*, Gr. *malachē;* Lat. *vinum*, Gr. *oinos*). Moreover, the form of the plough was the same among both peoples, as also their mode of cutting and preparing the grain; many of the usages of social life; the oldest methods of measuring the land; and the style of their national dress—the Latin *tunica*, corresponding exactly with the Greek *chiton*, while the Latin *toga* is only a fuller *himation*. Their method of building was also the same. Such evidence (and it could easily be extended) must be regarded as conclusively shewing that before the Latino-Italians entered Italy, they had been accustomed to till the ground, to make wine, to keep gardens, to build houses, and to decently clothe themselves. As to their social organisation, less can be said. It appears, however—judging from the general bearing of the most ancient traditions, as also from the features exhibited in historical times—that at a very early period, and from causes of which we are now absolutely ignorant, they had begun to develop the germs of what may be called 'state-life.' As among their Hellenic brethren, the original foundation of their social constitution was 'households' (Gr. *oikiai*, Lat. *vici* or *pagi*, from *pangere*, to 'fix' or 'drive in;' hence 'to build'): these, either by ties of blood, or by nearness of locality, were aggregated into clans, and their dwellings formed clan-villages (thus *pagus*, which probably meant at first only a single 'household,' came, by a natural transition, to denote a collection of households—a hamlet, or a village). Such clan-villages were, however, not regarded as independent societies, but as parts of a political canton or community—the *civitas* or *populus*. Each canton or *civitas* possessed a local centre or place of assembly, where justice was administered at regular intervals, where markets and sports were held, and religious rites celebrated, and which was besides fortified to serve as an asylum or place of refuge for the inhabitants of the open hamlets and their cattle in time of war. Such a centre was termed the *capitolium*, i. e., 'the height,' from being originally fixed on a height or hill-top, and corresponded to the *akra* of the Greeks. Round this stronghold of the canton, which formed the nucleus or beginning of the earliest Latin towns, houses gradually sprung up, which in their turn were surrounded by the *oppidum* ('work,' from *opus*), or the *urbs* ('ring-wall,' connected with *urvus, curvus, orbis*); hence, in later times, *oppidum* and *urbs* became, naturally enough, the recognised designations of town and city. Evidence is not wanting to justify this view of the genesis of the Latin towns. In the ruder and more mountainous districts of Central Italy, occupied by the Marsi, Æquicoli, &c., the system of living only in open villages prevailed down even to the close of the Empire, and there the Roman antiquarians found, to their inexplicable surprise, those solitary strongholds with their mysterious ring-walls, which, on the soil of Latium Proper, expanded into towns, but in the recesses of the Apennines never advanced beyond their original design.

The sites of the oldest of these cantonal-centres or primitive towns in Latium are to be sought for on the slopes of the Alban hills, where the springs are freshest, the air most wholesome, and the position most secure. Tradition (which makes Alba Longa the oldest seat of a Latin community) is here in accordance with natural probability.* On the same slopes lay Lanuvium, Aricia, and Tusculum, to the great antiquity of which ancient tradition bears testimony in many ways; on the offshoots of the Sabine range, in the east of Latium, stood Tibur and Praeneste; in the plain between the Sabine and Alban ranges, Gabii, Labici, and Nomentum; on or near the coast, Laurentum and Lavinium; and on the isolated hills overlooking the Tiber (the boundary between Latium and Etruria), the frontier town of Rome. How many cantons were originally in Latium, it is neither possible nor important to know. Tradition mentions 30 sovereign or politically independent communities (with Alba Longa at their head), which formed the famous Latin league. The historical order of their constitution is a point regarding which we are equally ignorant, but there is reason to believe that the Roman canton, or at least its capital, the town of R., was among the latest

* It is perhaps hardly necessary to remark that the story of the foundation of *Alba Longa* by Ascanius, the son of Æneas, and the introduction of a Tyrrheno-Trojan element into the primitive history of Latium, is an utterly worthless fable.

political organisations of the Latins. The history and fortunes of this canton we now proceed briefly to trace.

History of R. during the Earliest or Regal Period.—According to the myth of Romulus, R. was an offshoot from Alba-Longa, and to the biography of that hero we refer the reader for an outline of the ancient legend; but the most rational view of the city's origin is that which is suggested by a consideration of its site. It probably sprang into existence as a frontier-defence against the Etruscans, and as an emporium for the river-traffic of the country; but whether it was founded by a common resolve of the Latin confederacy, or by the enterprise of an individual chief, is beyond the reach even of conjecture. The date fixed upon for the commencement of the city, by the formation of the *Pomœrium*, viz., 21st April 753 B.C., is, of course, perfectly valueless in its precision. We know and can know nothing whatever on the point. The three 'tribes,' Ramnians, Tities, and Luceres, who appear in the Romuleian legend, as the constituent parts of the primitive commonwealth, suggest the idea that R. (like Athens) arose out of a *synoikismos* or amalgamation of three separate cantons; but Mommsen rejects as 'irrational' the common opinion that these cantons represent different races, and that the Romans were a 'mongrel people,' made up of Latins, Sabines, and Etruscans, with perhaps a dash of Hellenic and imaginary 'Pelasgic' blood in their veins! The existence of a Sabine element, represented by the Tities, is indeed admitted; but its introduction is thrown back to a period long anterior to the foundation of the city, when the Roman clans were still living in their open villages, and nothing of R. existed but its 'stronghold' on the Palatine. Nor is there anything to indicate that it materially affected the Latin character, language, polity, or religion of the commonwealth which was subsequently formed.

The motives which probably led to the building of R., also led to its rapid development, so that the great peculiarity of the Roman, as compared with the other Latin cantons, is the prominence which its urban life assumed in the earliest period. No doubt the Roman continued to manage his farm in the cantonal territory, but the insalubrity of the Campagna, as well as the advantages of river-traffic, and the necessity for watchfulness imposed upon all frontier towns in rude ages, must ever have acted as an inducement to him to take up his residence as much as possible in the city. The consequence was that the Roman became essentially a 'citizen,' while the other Latins remained essentially 'rustics.' So markedly is this the case, that the beginnings of Roman history—if the ancient legend may be so designated—are mainly records of its urban expansion and political growth. That the Palatine Hill was the oldest portion of the city is attested by a variety of circumstances. Not only does it hold that rank in the Romuleian legend, but on it were situated the oldest civil and religious institutions. The Romuleian myth of the establishment of an asylum on the Capitoline (see CAPITOL) for homicides and runaway slaves, with all its famous consequences—the *Rape of the Sabine Women*, the wars with the Latins of Cænina, Antemnæ, and Crustumerium, but especially with the Sabines of Cures under their king Titus Tatius, the tragic fate of Tarpeia, and the fine feminine valour of the ravished maidens, who had learned to love their captors, is historically worthless; except, perhaps, so far as it shews us how from the beginning the Roman burghers were engaged in constant feuds with their neighbours for the aggrandisement of their power. The entire history of the 'regal period,' in fact, has come down to us in so mythical and legendary a form, that we cannot feel absolutely certain of the reality of a single incident. That such personages as Numa Pompilius, Tullus Hostilius, Ancus Martius, Lucius Tarquinius Priscus, Servius Tullius, and Lucius Tarquinius Superbus, ever existed, or, if they did, that the circumstances of their lives, their institutions, their conquests, their reforms, were as the ancient narrative describes them, are things which no critical scholar can believe. The destruction of the city records by the Gauls, when they captured and burned R. in the 4th c. B.C., deprived the subsequent chroniclers of authentic information in regard to the past, and forced them to rely upon treacherous reminiscences, on oral tradition, on ballads, and on all the multifarious fabrications of a patriotic fancy, that would naturally seek compensation for political disaster in the splendour with which it would invest its primeval history. The utmost reach, therefore, to which our knowledge can attain, is to form some general idea—mainly by inference from the institutions that we find existing in later times—of the course that social and political progress followed in the Roman commonwealth.

From the very beginning of the city—and probably long before—the inhabitants were divided into two orders (exclusive of 'slaves')—viz., householders and their dependents, better known perhaps as 'patricians' (from *pater*, a father) and 'clients' (i. e., 'listeners' from *cluere*, 'to listen'). The former alone possessed political—i. e., burgess-rights. It was they who exclusively constituted the *populus* ('the people'); while the clients had no political existence whatever. How this latter class originated we do not know, but 'superiors' and 'inferiors' exist everywhere, and there is really nothing wonderful in the phenomena, except the rigour of their political subjection. In a thriving community like the Roman, which seems to have always held a somewhat isolated and antagonistic position to the other Latin cantons, new-comers, such as refugees and the like, would be frequent; and these alien settlers, it is clear, never obtained (except under very special circumstances) the privileges of the original Roman families. That the clients formed a body essentially different from the *plebs*, is not true, and seems based merely on the mythical account of what followed the destruction of Alba Longa by Tullus Hostilius. The name plebs (i. e., 'the multitude,' from the same root as *pleo*, I fill, *plenus*, full; with which is perhaps connected the other Latin word *vulgus*, Eng. *folk*), is doubtless, as its signification indicates, of later origin than *clientes*; but both are applicable to the same persons, who were called 'listeners,' in reference to their being dependents on the different burgess-households, and the 'multitude,' in reference to their want of political rights. The constitution of the state was simple. All the burgesses were politically on a footing of equality. From their own ranks was chosen the king or 'leader' (*rex*), who was therefore nothing more than an ordinary burgess—a husbandman, a trader, a warrior, set over his fellows. But it must at the same time be observed, that his authority was great, for the Roman state was based on the Roman household, and something of the absoluteness of the *patria potestas* appears in the uncircumscribed nature of the regal powers. The *rex* held his office for life; he consulted the national gods; he appointed the priests and priestesses; he called out the *populus* for war, and led the army in person; his command (*imperium*) was not to be gainsayed, on which account on all official occasions he was preceded by 'messengers' or 'summoners' (*lictores*, from *licere*, 'to summon,' though commonly

given from *ligo*, 'to bind'), bearing the 'fasces' (axes and rods tied up together), the symbols of power and punishment; he had the keys of the public chest, and he was supreme judge in all civil and criminal suits. The Roman religion or *cultus* was from the first thoroughly subordinate to the authority of the state; and all that we can infer from the myth of Numa is that R. perhaps owed its colleges of augurs and pontiff to the wisdom of some enlightened sovereign who felt himself at times embarrassed in his decisions on matters of religious and public law, and recognised how valuable might be the aid afforded him by a body of sacred experts. We may rest certain that originally the sole power was the regal, and that the subordinate magistracies found at a later time arose from a delegation of regal authority, rendered necessary by the ceaseless increase of state-business. 'All the officials of the earliest period,' says Mommsen (who has expounded this view with admirable sagacity in his chapter on the "Original Constitution of Rome"), 'the extraordinary city-warden (*præfectus urbi*, who doubtless governed in the absence of the *rex*), as well as those who were probably nominated regularly, the "trackers of foul murder" (*quæstores parricidii*), and the "leaders of division" (*tribuni*, from *tribus*, part) of the infantry (*milites*), and of the cavalry (*celeres*), were mere royal commissioners, and not magistrates in the subsequent sense of the term.' On the other hand, we may believe that the *senatus*, or Council of the Elders, from its very nature, was as old an institution as the monarchy itself. Among the very first things the 'citizen-king' would do, would be to choose out of the ranks of his fellow-burgesses a number of experienced men to assist him with their counsel; but it is to be observed that this body possessed no coercive or constraining powers. They gave their advice when the *rex* chose to ask it; that was all. Yet as the tenure of their office was for life, they necessarily possessed great *moral* authority; and it was only when the king, the senate, and the community were at one in regard to any important matter—a war, for example—that it was held to be righteous, and likely to be favoured by the gods. The burgesses, or householders, were divided into *curiæ*—i. e., 'wardships,' connected probably with *cura* and *curare*, 'to care for,' rather than with *quiris*, and the Sabine *cures*, as Varro thinks. Ten households formed a *gens* (a 'clan' or 'family'); 10 clans, or 100 households, formed a *curia*, or wardship; and 10 wardships, or 100 clans, or 1000 households, formed the *populus*, *civitas*, or community. But as Rome was a *synoikismos* of three cantons, the actual number of wards was 30, of clans 300, and of households 3000. Every household had to furnish one foot-soldier (hence the name *mil-es*, the 'thousandth walker,' from *mil*, and *eo* (?) 'to go'), and every clan a horseman and a senator. Each ward was under the 'care' of a special warden (the *curio*), had a priest of its own (the *flamen curialis*), and celebrated its own festivals. None but burgesses could bear arms in defence of the state (hence their designation, *populus*, 'the warrior body,' connected with *populari*, 'to lay waste,' and *popa*, 'the priest, or priest's assistant, who felled the victim at the altar—the sacred butcher'). In the old litanies the blessing of Mars is invoked upon the *pilumnus poplus* ('the spear-armed warrior-body'), and when the *rex* addressed them, it was by the name of *quirites* ('lancemen,' from *quiris*, or *curis*, a 'lance,' and *eo*, 'to go'). The original Roman army, or *legio* (i. e., 'the gathering'), was composed of three 'hundreds' (*centuriæ*) of horsemen (*celeres*—i. e., 'the swift,' or *flexuntes*, 'the wheelers'), under their divisional leaders (*tribuni celerum*); and three 'thousands' of footmen (*milites*), also under divisional leaders (*tribuni militum*); to whom were added a number of light-armed skirmishers (*velites*), especially 'archers' (*arquites*). The *rex*, as we have said, was usually the general, but as the cavalry force had a colonel of its own (*magister equitum*), it is probable that he placed himself at the head of the infantry. Military service was no doubt the prime duty of the Roman burgesses, but the king could impose upon them any labours that he reckoned necessary or advantageous to the welfare of the state, such as the erection of public edifices, the tilling of the royal demesnes, the execution of royal commissions, or the building of the city walls.

The 'foreign policy' of R. seems to have been aggressive from the first, and this character it retained as long as the aggrandisement of the state was possible. We have, it is true, no certain knowledge of the primitive struggles in which the enterprising and ambitious Roman burghers were engaged, but it appears from the legend that at a very early period the neighbouring Latin communities of Antemnæ, Crustumerium, Ficulnea, Medullia, Cænina, Corniculum, Cameria, Collatia, were subjugated. The crisis of the Latin War, however, was undoubtedly the contest with Alba Longa, in which that 'sacred metropolis' of Latium was destroyed, and its leadership passed to the conqueror. How deadly the struggle between the two was, may be inferred from the tragic details in which the legend abounds. As a rule, on the subjugation of a canton, the conquered inhabitants were allowed to remain in their open hamlets, but their *capitolium* was razed, their weekly market, their justice-court, their gods—everything, in short, strictly national—were removed to R., while they themselves were enrolled among the clients or plebs. But sometimes the inhabitants themselves, in whole or part, were transferred to R., and individuals or clans were even received into the ranks of the Roman burgesses, as in the case of Alba Longa. Some of the famous Roman *gentes* claimed to be of Alban descent—the Julii, Servilii, Quinctilii, Cloelii, Geganii, Curiatii, and Metilii. The wars with the Etruscans of Fidenæ and Veii—assigned, like the destruction of Alba Longa, to the reign of Tullus Hostilius—were apparently indecisive; those with the Rutuli and Volsci, however, were probably more fortunate; but uncertainty hangs like a thick mist over the ancient narrative. Even the story of the Tarquins, though it belongs to the later period of the monarchy, is in many of its details far from credible. Both Niebuhr and Mommsen consider 'Tarquin the Proud' a historical personage, and without accepting literally all the circumstances of the tradition, believe the general outline—his character, his exactions, his expulsion, and his desperate efforts for the recovery of the throne—to be trustworthy. The memory of such a monarch was likely to be preserved by the very strength of the hatred he excited, and an act so daring as his expulsion (which was at the same time the death-knell of a system of government that had prevailed for ages) could hardly be a mere invention, though it might be overlapped with fold upon fold of picturesque fiction. The view taken by Napoleon III. (see *Histoire de Jules César*, vol. i.), that the primitive monarchy had served its purpose, and had consequently to disappear, is perhaps not so erroneous as the oracular language of the imperial author would lead us to suppose. The aristocracy or *populus* had become so much more powerful than the individual *rex*, that they wished to possess *de jure* as well as *de facto* the supreme authority. The pride and tyranny of a Tarquin

may very well have aided in furthering their designs.

Meanwhile a great internal change had taken place in Rome. This is usually designated the Servian 'Reform of the Constitution,' although the expression is calculated to mislead. There was nothing directly political in the 'reform.' It was only a reform in the burgess-levy—i. e., in the mode of raising the army. Formerly, as we have seen, none but burgesses could bear arms in defence of the state; but the increase of the general population, caused partly by the annexation of the conquered Latin communities, and partly by time, had totally altered the relation in which the non-burgesses, or *plebs*, originally stood to their political superiors. The *plebs* could, of course, acquire property and wealth, and could bequeath it just as legally as the *populus;* moreover, such of the Latin settlers as were wealthy and distinguished in their own communities, did not cease to be so when they were amalgamated with the Roman 'multitude.' It was therefore felt to be no longer judicious to let the military burdens fall exclusively upon the old burgesses, while the rights of property were equally shared by the non-burgesses. Hence the new arrangement, known in Roman history as the formation of the *Comitia Centuriata*. When or with whom the change originated, it is impossible to say. The legend assigns it to Servius Tullius, predecessor of Tarquin the Proud; and it was in all probability the work of some kingly ruler who saw the necessity of reorganising the national forces. That it cannot be regarded as a change brought about by party-zeal, is obvious when we reflect that it conferred no rights, but only imposed duties on the plebeians. Its details were briefly as follows: Every Roman freeholder from the age of 17 to 60, whether patrician or plebeian, was made liable to serve in the army; but he took his place according to the amount of his property. The freeholders were distributed into five *classes* (i. e., 'summonings,' from *calare*, to 'summon' or 'call out'), and these *classes*, all of whom were infantry, were again subdivided into *centuriæ* ('hundreds'). The *first* class, which required to possess property valued at 100,000 ases, or an entire hide of land, furnished 82 'hundreds;' the second, property valued at 75,000 ases, or ¾ths of a hide of land, furnished 20 'hundreds;' the third, property valued at 50,000 ases, or ½ hide of land, furnished 20 'hundreds;' the fourth, property valued at 25,000 ases, or ¼th hide of land, furnished 20 'hundreds;' and the fifth, property valued at 12,500 ases, or ⅛th hide of land, furnished 32 'hundreds.' A single 'hundred' was, moreover, added from the ranks of the non-freeholders, or *proletarii* (mere 'children-begetters'), although it is possible that from the same order came the two 'hundreds' of 'horn-blowers' (*cornicines*), and 'trumpeters' (*tibicines*), attached to the fifth class. Thus the infantry 'hundreds' amounted to 175, that is, 17,500 men, besides whom were 18 'hundreds' of *equites* ('horsemen') chosen from the wealthiest burgesses and non-burgesses; so that the Roman army now numbered in all nearly 20,000 men. We have stated that the original design of this new arrangement was merely military, but it is easy to see that it would soon produce political results. Duties and rights are correlative. The former suggest the latter, and create a desire for their attainment. Hence the Servian military reform paved the way for the grand political struggle between the patricians and the plebeians, which commenced with the first year of the Republic, and only terminated with its dissolution.

The Roman Republic from its Institution to the Abolition of the Decemvirate.—1. *Internal History.*—According to the legend, the expulsion of the Tarquins was mainly the work of their cousins, Junius Brutus and Tarquinius Collatinus, in revenge for the outrage on the honour of Lucretia, and was followed by the abolition of the monarchy. The date usually assigned to this event is 509 B.C. The story is intensely tragical, and if we must consider it poetry rather than fact, yet it may safely be taken as evidence that it was an unbridled lust of power and self-gratification that brought ruin on the Romano-Tuscan dynasty. Of course, we can make nothing definite out of the early years of the republic. Dates and names, and even events, must go for very little. Valerius Publicola or Poplicola, Sp. Lucretius, M. Horatius, Lars Porsenna (q. v.) of Clusium, Aulus Postumius, with the glorious stories of Horatius Cocles and the battle of Lake Regillus, will not bear to be scrutinised. We must content ourselves with the knowledge of historical tendencies and general results. The change from 'kings' to 'consuls' (*consules*, 'those who leap together'—more generally, those who *act* together) was not intended to diminish the administrative power of the supreme rulers, but only to deprive them of the opportunity of doing harm—of becoming Tarquins; and this it effectually succeeded in doing, by limiting their tenure of office to a year, and by numerous other restrictions. (For an account of their original functions, and of the subsequent modifications which these underwent, see CONSUL.) It is believed to have been about this time, and in consequence of the new political changes, that the old assessors of the king, such as the *quæstores parricidii*, formally became standing magistrates instead of mere honorary counsellors, and also that the priesthood became a more self-governing and exclusive body. During the regal period the priests were appointed by the king, but now the colleges of augurs and pontiffs began to fill up the vacancies in their ranks themselves, while the vestals and separate 'flamens' were nominated by the pontifical college, which chose a president (*pontifex maximus*) for the purpose. The lapse of years ever increasing the quantity of sacred lore, also increased its importance, and the importance of those who specially studied it; and nothing comes out more clearly in the early history of the republic than the fact, that the opinions of the augurs and pontiffs became more and more legally binding. This is to be connected with the fact, that in every possible way the patricians or old burgesses—now rapidly becoming a mere *noblesse*—were seeking to rise on the ruins of the monarchy, and to preserve separate institutions for the benefit of their own order, when they could with difficulty longer exclude the *plebs* from participation in common civic privileges. In the details given us of the 'Servian Reform,' we can easily discern a spirit of compromise, the concessions made to the plebeians in the constitution and powers of the *Comitia Centuriata* being partially counterbalanced by the new powers conferred on the old burgess body, the *Comitia Curiata*—viz., the right of confirming or rejecting the measures passed in the Lower Assembly. Towards the new assembly, therefore, it stood somewhat in the relation in which the House of Lords stands to the House of Commons, but the analogy must not be pushed too far; it is only general. The character of the senate altered under the action of the same influences. Although it never had been formally a patrician body—although admission to it under the kings was obtainable simply by the exercise of the royal prerogative, yet, practically, 299 out of the 300 senators had always been patricians; but after the institution of the republic, we are told

that the blanks in the senate were filled up *en masse* from the ranks of the plebeians, so that of the 300 members less than half were *patres* ('full burgesses'), while 164 were *conscripti* ('added to the roll'); hence the official designation of the senators *patres et conscripti* ('full burgesses and enrolled').

As yet, however, it is to be observed the plebeians were rigorously excluded from the magistracies. They could vote—i. e., they could exercise legislative powers—but they had no share in the administration. None but patricians were eligible for the consulship, for the office of quæstor, or for any other executive function, while the priestly colleges rigidly closed their doors against the new burgesses. The struggle, therefore, between the two orders went on with ever-increasing violence. One point comes out very clearly from the narrative, however dubious we may be of the particular details, viz., that the establishment of the republic and the reconstitution of the burgess body, instead of allaying discontent, only fostered it. Power virtually passed into the hands of the capitalists, and though some of these were plebeians, yet they would seem to have preferred their personal money-interests to the interests of their order, and to have co-operated with the patricians. The abuse by these capitalists of the *Ager Publicus*—that is, such portion of the land of a conquered people as had been taken from them, annexed to the Roman state, and let out originally to the patricians at a fixed rent (see AGRARIAN LAW), together with the frightful severity of the law of debtor and creditor, the effect of which was all but to ruin the small plebeian 'farmers,' who constituted, perhaps, the most numerous section of the burgesses—finally led to a great revolt of the plebs, known as the 'Secession to the Sacred Hill,' the date assigned to which is 494 B.C. On that occasion the plebeian farmer-soldiers, who had just returned from a campaign against the Volscians, marched in military order out of Rome, under their plebeian officers, to a mount near the confluence of the Anio with the Tiber, and threatened to found there a new city, if the patricians did not grant them magistrates from their own order; the result was, the institution of the famous plebeian tribunate (see TRIBUNE)—a sort of rival power to the patrician *consulate*, by means of which the plebeians, at least, hoped to be shielded from the high-handed oppressions of the wealthy. To the same period belongs the institution of the ÆDILES (q. v.). A little later, the *Comitia Tributa* emerged into political prominence. This was really the same body of burgesses as formed the *Comitia Centuriata*, but with the important difference, that the number of votes was not in proportion to a property classification. The poor plebeian was on a footing of equality with the rich patrician; each gave his vote, and nothing more. Hence the *Comitia Tributa* virtually became a plebeian assembly, and when the *plebiscita* ('Resolutions of the plebs' carried at these *comitia*) acquired (as they did by the Valerian Laws passed after the abolition of the Decemvirate) a legally binding character, the victory of the 'multitude' in the sphere of legislation was complete. From this time the term *populus* practically, though not formally, loses its exclusive significance; and when we speak of the Roman citizens, we mean indifferently patricians and plebeians. The semi-historical traditions of this period—for we are now (5th c. B. C.) beginning to emerge out of the mythical era—unmistakably shew that the institution of the tribunate led to something very like a civil war between the two orders. Such is the real significance of the legends of Caius Marcus, surnamed *Coriolanus* (q. v.); the surprise of the Capitol by the Sabine marauder, Appius Herdonius, at the head of a motley force of political outlaws, refugees, and slaves; the migrations of numerous Roman burgesses with their families to more peaceful communities; the street-fights; the assassinations of plebeian magistrates; the annihilation by the Etruscans of the Fabian *gens*, who had left R. to escape the vengeance of their order for having passed over to the side of the plebeians; and the atrocious judicial murder of Spurius Cassius, an eminent patrician, who had also incurred the deadly hatred of his order, by proposing an agrarian law that would have checked the pernicious prosperity of the capitalists and overgrown landholders. Finally, 462 B.C., a measure was brought forward by the tribune C. Terentillius Ursa, to appoint a commission of ten men to draw up a code of laws for the purpose of protecting the plebeians against the arbitrary decisions of the patrician magistrates. A fierce, even a frantic opposition was offered by the patricians, and the ten years that followed were literally a period of organised anarchy in Rome. At length the nobles gave way, and the result was the drawing up of the famous code known as the *Twelve Tables*—at first *Ten*, to which two were afterwards added—the appointment of the DECEMVIRI (q. v.), and the abolition of all the ordinary magistrates, both patrician and plebeian. The government by decemvirs, however, lasted only two years; according to tradition, the occasion of its overthrow was the attempt of the principal decemvir, Appius Claudius (q. v.) to possess himself by violence of the beautiful daughter of Virginius, a Roman centurion; but the real cause was doubtless political, though the cruel lust of a Claudius may have afforded the occasion; the result of which was the restoration of the pre-decemviral state of things—the patrician consulate and the plebeian tribunate.

2. *External History.*—The external history of R., from the establishment of the republic to the abolition of the decemvirate, is, it need hardly be said, purely military. The Romans fought incessantly with their neighbours. Long before the close of the regal period they had acquired, as we have seen, the leadership of Latium, and in all the early wars of the republic they were assisted by their allies and kinsmen; sometimes also by other nations—as, for example, the Hernicans, between whom and the Romans and Latins a league was formed by Spurius Cassius in the beginning of the 5th c. B.C. The most important of these wars were those with the southern Etruscans, especially the Veientines, in which, however, the Romans made no way, and even suffered terrible disasters, of which the legend concerning the destruction of the Fabian *gens* on the Cremera (477 B.C.) may be taken as a distorted representation; the contemporaneous wars with the Volscians, in which Coriolanus is the most distinguished figure; and those with the Æqui (458 B.C.), to which belongs the fine legend of Cincinnatus (q. v.).

From the Abolition of the Decemvirate to the Defeat of the Samnites, and the Subjugation of all the 'Italians' (449—265).—1. *Internal History.*—The leading political features of this period are the equalisation of the two orders, and the growth of the new aristocracy of capitalists. After the abolition of the decemvirate, it would seem—judging from the course of events—that the whole of the plebeian aristocracy, senators and capitalists (from motives of selfish aggrandisement), combined with the 'masses' of their order to make a series of grand attacks on the privileges of the old Roman *noblesse*. The struggle lasted for 100 years; and ended, as it could only end, by the removal of all the social and

political disabilities under which the plebeians had laboured—though the stratagems and artifices to which the old aristocracy had recourse, proved the reluctance with which they succumbed to fate. First in 445 B. C., only four years after the fall of the decemvirs was carried, the *Lex Canuleia*, by which it was enacted that marriage between a patrician and plebeian should be legally valid. At the same time, a compromise was effected with respect to the consulship. Instead of two patrician consuls, it was agreed that the supreme power should be intrusted to new officers termed 'Military Tribunes with Consular Power,' who might be chosen equally from the patricians or plebeians. Ten years later (435 B. C.), the patricians tried to render the new office of less consequence by the transference of several of the functions hitherto exercised by consuls to two special patrician officers named *Censors* (q. v.). The 'censorship,' Mommsen remarks, 'gradually became the palladium of the aristocratic party, less on account of its financial influence, than for the sake of the right annexed to it of filling up vacancies in the senate and in the equites.' In 421 B. C., the quæstorship (see QUÆSTOR) was thrown open to the plebeians; in 368 B. C., the mastership of the horse; in 356 B. C., the dictatorship (see DICTATOR); in 351 B. C., the censorship; in 337 B. C., the prætorship (see PRÆTOR); and in 300 B. C., the pontifical and augurial colleges. These victories were not all won without the shedding of blood. How great was the exasperation of the patricians may be estimated from the story of Spurius Maelius, the rich plebeian, who was murdered simply because in a season of famine he sold corn at a very low price to the poor.

The only effect, it is to be observed, of these political changes was to increase the power of the rich plebeians; and consequently, the social distress continued to shew itself as before. No genuine national concord was possible so long as *that* remained unmitigated. Efforts were repeatedly made by individuals to remedy the evil, but without success. Such were the attempts of the tribunes Spurius Maecilius and Spurius Metilius (417 B. C.) to revive the agrarian law of Spurius Cassius; and of the noble and patriotic patrician, Marcus Manlius, who, though he had saved the Capitol during the terrible Gallic siege, was hurled from the Tarpeian Rock (384 B. C.), on the customary charge, as groundless in his case as it was base, of aspiring to the monarchy; but at length (367 B. C.), after a furious struggle of eleven years, the famous Licinian Rogations (see AGRARIAN LAW) were carried, by means of which it was hoped that an end had been put to the disastrous dissensions of the orders. Thus, at least, we interpret the act of the dictator Camillus, who raised a temple to the goddess *Concord*, at the foot of the Capitol.

That these laws operated beneficially on the class in whose interest they were passed, viz., the plebeian-farmers or middle-class of the Roman state, is unquestionable; but events proved that they were inadequate to remedy the evil, and after a time they ceased to be strictly enforced. On the other hand, there can be as little doubt that, owing partly to these changes, and still more to the splendid and far-reaching conquests achieved in Italy during this period of internal strife by the Roman arms, the position of the plebeian farmer was decidedly raised. Not only were the 'general coffers filled' by the revenue drawn directly or indirectly from the subjugated lands, so that a *tributum* (a forced loan) seldom required to be enforced at home, but the numerous colonies which R. now began to send forth to secure her new acquisitions, consisted entirely of the poorer plebeians, who always received a portion of the land in the district where they were settled. The long struggle between the two orders was thus virtually at an end; but the date usually assigned to the termination of the strife is 286 B. C., when the *Lex Hortensia* was passed which confirmed the Publilian Laws of 339 B. C., and definitely gave to the *Plebiscita* passed at the Comitia of the Tribes, the full power of laws binding on the whole nation. Gradually, however, by steps which we have not room to trace, the importance of the popular assemblies declined, and that of the senate rose. This was owing mainly to the ever-increasing magnitude of the Roman state, and to the consequent necessity of a powerful governing body. The senate, it will be remembered, originally possessed no administrative power at all, but now it commenced a series of vast usurpations of which the best defence is that they excited no opposition among the community. Every matter of general importance—war, peace, alliances, the founding of colonies, the assignation of lands, building, the whole system of finance—came under its supervision and authority. Nor, on the whole, did it prove itself the unworthy arbiter of a nation's destinies. It was not a self-elected oligarchy, but was rather composed of the ablest representatives of both orders.

2. *External History.*—We have said that the military successes of R. during this period of internal strife were great; but we can only briefly allude to them. The irruption of the Gauls into sub-Apennine Italy (391 B. C.), though accompanied by frightful devastations, was barren of results, and did not materially affect the progress of Roman conquest. No doubt the battle on the Allia, and the capture and burning of R. (390 B. C.), were great disasters, but the injury was temporary. The vigilance of Manlius saved the Capitol, and the heroism of Camillus revived the courage and spirit of the citizens. Again and again in the course of the 4th c. B. C., the Gallic hordes repeated their incursions into Central Italy, but never again returned victorious. In 367 B. C., Camillus defeated them at Alba; in 360 B. C., they were routed at the Colline Gate; in 358 B. C., by the dictator, G. Sulpicius Peticus; and in 350 B. C., by Lucius Furius Camillus. Meanwhile, aided by their allies, the Latins and the Hernicans, the Romans carried on the long and desperate struggle with the Æquians, Volscians, and Etruscans. Finally, but not till after they had sustained repeated defeats, the Romans triumphed. The causes that led to the decline of the Etruscan power, which, at the close of the regal period in R., and during the infancy of the republic, had been enormous, both by sea and land, cannot be considered at length here. Suffice it to say, that the terrible irruption of the Gallic barbarians into Etruria, and the victories of the Samnites in Campania, where also the Etruscans had established themselves, as well as the miserable jealousies of the different cities, combined to paralyse the power of this people, and paved the way for the final triumph of Rome. But even before the Gauls had crossed the Apennines, the fate of Etruria was virtually sealed. The fall of Veii (q. v.), 396 B. C., was really the death-knell of Etruscan independence. Although the story has undoubtedly descended to us in a mythical dress, the siege of Veii is by no means to be placed in the same category with the siege of Troy, albeit, like it, it is said to have lasted ten years. Falerii, Capena, and Volsinii—all sovereign cities of Etruria—hastened soon after to make peace, and by the middle of the 4th c. B. C., the whole of Southern Etruria had submitted to the supremacy of R., was kept in check by Roman garrisons, and denationalised

by the influx of Roman colonists. In the land of the Volsci, likewise, a series of Roman fortresses were erected to overawe the native inhabitants; Velitrae, on the borders of Latium, as far back as 492 B. C., Suessa Pometia (442 B. C.), Circeii (393 B. C), Satricum (385 B. C.), and Setia (382 B. C.): besides the whole Volscian district, known as the Pontine Marshes (q. v.), was distributed into farm-allotments among the plebeian soldiery. Becoming alarmed, however, at the increasing power of Rome, the Latins and Hernicans withdrew from the league, and a severe and protracted struggle took place between them and their former ally. Nearly thirty years elapsed before the Romans succeeded in crushing the malcontents, and restoring the league of Spurius Cassius. In the course of this war, the old Latin confederacy of the 'Thirty Cities' was broken up (384 B. C.), probably as being dangerous to the hegemony (now rapidly becoming a supremacy) of R., and their constitutions were more and more assimilated to the Roman. The terms of the treaty made by the Romans (348 B. C.) with the Carthaginians shew how very dependent was the position of the Latin cities. Meanwhile, the Romans had pushed their garrisons as far south as the Liris, the northern boundary of Campania. Here they came into contact with the Samnites (q. v.), a people as heroic as themselves, their equals in everything but unity of political organisation; perhaps their superiors in magnanimity.

The Samnites had long been extending their conquests in the south of Italy, just as R. had in the centre and in Etruria. Descending from their native mountains between the plains of Apulia and Campania, they had overrun the lower part of the peninsula, and under the name of Lucanians, Bruttians, &c., had firmly established themselves, threatening everywhere the prosperity of the Greek and Etruscan possessions in those regions. But it was the dwellers in the original mountain territory who properly bore the name of Samnites, and between them and the Romans now commenced a tremendous struggle; the former fighting heroically for the preservation of their national freedom—the latter warring with superb valour for dominion. We cannot afford space to recount the circumstances that brought about the collision, further than to state that the Samnite colonies had in the course of time become so detached in sympathy, and so changed in character and interests from the parent stock, as almost to forget their original unity. Hence, hostilities were common between them; and the forays of the Samnite Highlanders in the rich lowlands of Campania were dreaded above all things by their more polished but degenerate kinsmen of Capua, who had acquired the luxurious habits of the Greeks and Etruscans. It was really to save themselves from these destructive forays that the Campanians offered to place themselves under the supremacy of R.; and thus Romans and Samnites were thrown into a position of direct antagonism. The Samnite Wars, of which three are reckoned, extended over 53 years (343—290 B. C.). The second, generally known as the 'Great Samnite War,' lasted 22 years (326—304 B. C.). At first, the success was mainly on the side of the Samnites; and after the disaster at the *Caudine Forks* (q. v.), it seemed as if Samnium and not R. was destined to become the ruler of Italy, but the military genius of the Roman consul, Quintus Fabius Rullianus (see FABIUS), triumphed over every danger, and rendered all the heroism of Caius Pontius, the Samnite leader, unavailing. In 304 B. C., Bovianum, the capital of Samnium, was stormed, and the hardy Highlanders were compelled to acknowledge the supremacy of the republic. The third war (298—290 B. C.) was conducted with all the sanguinary energy of despair; but though the Etruscans and Umbrians now joined the Samnites against the Romans, their help came too late. The victory of Rullianus and of P. Decius Mus, at Sentinum (295 B. C.), virtually ended the struggle, and placed the whole of the Italian peninsula at the mercy of the victor. It only remains to be mentioned here that at the close of the first Samnite War, which was quite indecisive, an insurrection burst out among the Latins and Volscians, and spread over the whole territory of these two nations; but the defeat inflicted on the insurgents at Trifanum (340 B. C.) by the Roman consul, Titus Manlius Imperiosus Torquatus, almost instantly crushed it, and in two years the last spark of rebellion was extinguished. The famous Latin league was now dissolved; many of the towns lost their independence, and became Roman *municipia*; new colonies were planted both on the coast and in the interior of the Latino-Volscian region; and finally, so numerous were the farm-allotments to Roman burgesses, that two additional tribes had to be constituted.

From the Close of the Samnite to the Commencement of the Punic Wars.—The war with Pyrrhus (q. v.), king of Epirus, which led to the complete subjugation of Peninsular Italy, is a sort of pendant to the great Samnite struggle. It was brought about in this way. The Lucanians and Bruttians, who had aided the Romans in the Samnite Wars, considering themselves cheated of their portion of the spoil, entered into negotiations with the enemies of their former associate throughout the peninsula. A mighty coalition was immediately formed against R., consisting of Etruscans, Umbrians, and Gauls in the north, and of Lucanians, Bruttians, and Samnites in the south, with a sort of tacit understanding on the part of the Tarentines that they would render assistance by and by. The rapidity with which it took shape shews alike the fear and the hatred inspired by the Roman name. In the course of a single year, the whole north was in arms, and once more the power, and even the existence of R., were in deadly peril. An entire Roman army of 13,000 men was annihilated at Arretium (284 B. C.) by the Senonian Gauls, but that dauntless spirit which the republic never failed to display in the crisis of its fortunes, and which gives a sublime dignity to its worst ambition, now shone out in the fulness of its splendour. Publius Cornelius Dolabella marched into the country of the Senones at the head of a large force, and literally extirpated the whole nation, which henceforth disappears from history. Shortly afterwards, the bloody overthrow of the Etrusco-Boian horde at Lake Vadimo (283 B. C.) shattered to pieces the northern confederacy, and left the Romans free to deal with their adversaries in the south. The Lucanians were quickly overpowered (282 B. C.); Samnium, broken by its long and luckless struggle, and overawed by the proximity of a Roman army, could do nothing. A rash and unprovoked attack on a small Roman fleet now brought down on the Tarentines the vengeance of R., at the very moment R. was free to exert all her terrible power. Awaking to a sense of their danger, the Tarentines invited Pyrrhus (q. v.), over from Epirus, and appointed him commander of their mercenaries. This royal adventurer, a man of the most brilliant, but also of the most volatile genius, resembling no modern general so much as Charles Mordaunt, Earl of Peterborough, arrived in Italy (280 B. C.) with a small army of his own, and a vague notion in his head of founding a Hellenic empire in the west, that should rival that created

in the east by his kinsman, Alexander the Great. It is not necessary to narrate here the varying fortunes of the struggle between Pyrrhus and the Romans, which lasted only six years, and ended in his being obliged to return to Epirus without accomplishing anything.

After Pyrrhus, baffled in his attempts to check the progress of R., had withdrawn to Greece, the Lucanians and Samnites, whom his reputation and original successes had induced to rise once more against the dreaded foe, continued the unequal struggle, but 'even the bravery of despair,' as it has been said, 'comes to an end; the sword and the gibbet at length (269 B.C.) carried peace over into the mountains of Samnium.' Tarentum had surrendered three years earlier; and now from the Macra and the Rubicon to the Straits of Messana, there was not a nation in Italy that did not acknowledge the supremacy of Rome. Distant kingdoms began to feel that a new power had risen in the world; and when Ptolemy Philadelphus, sovereign of Egypt, heard of the overthrow of the famous Epirote warrior, he sent an embassy to R. (273 B.C.), and concluded a treaty with the republic. To secure their new acquisitions, the Romans established in the south military colonies at Pæstum and Cosa, in Lucania (273 B.C.); at Beneventum (268 B.C.), and at Æsernia (263 B.C.), to overawe the Samnites; and in the north, as out-posts against the Gauls, Ariminum (268 B.C.), Firmum in Picenum (264 B.C.), and the burgess colony of Castrum Novum. Preparations were also made to carry the great Appian highway as far as Brundisium, on the Adriatic, and for the colonisation of the latter city as a rival emporium to Tarentum.

The political changes were almost as important as the military. The whole population of Peninsular Italy was divided into three classes—1. *Cives Romani*, or such as enjoyed the full burgess privileges of Roman citizens; 2. *Nomen Latinum*—that is, such as possessed the same privileges as had been enjoyed by the members of the quondam Latin league—viz., an equality with the Roman burgesses in matters of trade and inheritance, the privilege of self-government, but no participation in the Roman franchise, and consequently no power to modify the foreign policy of the state; 3. *Socii*, or 'Allies,' to some of whom were conceded most liberal privileges, while others were governed in an almost despotic fashion. The *Cives Romani* no longer embraced merely the inhabitants of the old Roman community, the well-known 'tribes' (of whom there were now thirty-three), but all the old burgess-colonies planted in Etruria and Campania, besides such Sabine, Volscian, and other communities as had been received into the burgess body on account of their proved fidelity in times of trial, together with individual Roman emigrants or families of such, scattered among the *municipia*, or living in villages by themselves. The cities possessing the *Latinum Nomen* included most of the 'colonies' sent out by R. in later times, not only in Italy, but even beyond it; the members of which, if they had previously possessed the Roman franchise, voluntarily surrendered it in lieu of an allotment of land. But any 'Latin' burgess who had held a magistracy in his native town, might return to R., be enrolled in one of the tribes, and vote like any other citizen. The *Socii* comprised all the rest of Italy, as the Hernicans, the Lucanians, Bruttians, the Greek cities, &c. All national or cantonal confederacies and alliances among the Italians were broken up, and no means were left unemployed by the victors to prevent their restoration.

The Punic Wars.—The origin of Carthage, and the steps by which she rose to power, are sketched in the article CARTHAGE. At the time when she came into collision with R. she was indisputably the first maritime empire in the world, ruling as absolutely in the central and western Mediterranean seas as R. in the Italian peninsula. Between the Carthaginians and the Romans there had long existed a nominal alliance—the oldest treaty dating as far back as the 6th c. B.C. But this alliance had never possessed any real significance, and latterly the two nations had come to regard each other with considerable distrust. The incident that occasioned the outbreak was quite trivial, and need not be recorded. Suffice it to say that in 264 B.C., war was formally declared between the two nations, and incomparably the most terrible contest in which R. was ever engaged, began.

We do not propose to follow minutely the course of the famous Punic Wars—the details of which are narrated at sufficient length under the heads CARTHAGE, HAMILCAR, HANNIBAL, HASDRUBAL, HIERO, REGULUS, METELLUS, FABIUS, MARCELLUS, SCIPIO, and NUMIDIA, to which we refer the reader, but we may briefly indicate their character and result. The wars with Carthage, like those with Samnium, were three in number. The *first* lasted 23 years (B.C. 264—241), and was waged mainly for the possession of Sicily. Its leading feature was the creation of a Roman navy, which, after repeated and tremendous misfortune, finally wrested from Carthage the sovereignty of the seas. R., indeed, had never been a merely agricultural state, as may be inferred from a variety of particulars—e.g., the antiquity of the galley in the city arms, of the port-dues on the exports and imports of Ostia, and of commercial treaties with transmarine states—but events had hindered it from engaging to any large extent in maritime enterprise; and its shipping, or at least its fleet, was still quite insignificant, although it had become master of nearly all the Italian seaboard. The necessity for a navy now began to shew itself. Not only was there a difficulty felt in transporting troops to Sicily, but the shores of the mainland were completely exposed to the ravages of Carthaginian squadrons. So energetically did the senate set to work, that (we are told) in sixty days from the time the trees were felled, 120 ships were launched, and soon after the consul Caius Duilius gained a brilliant success (260 B.C.) over the Carthaginians off Mylae, on the north-east coast of Sicily. The exultation of the Romans knew no bounds; and the 'triumph' which Duilius received on his return to the city, had more the aspect of a carnival than of a noble ceremony. The *Columna Rostrata* ('Beaked Column') in the Forum preserved for ages the memory of the 'glorious victory.' Subsequent events, however, were less favourable. An invasion of Africa by Regulus (q. v.) ended in disaster, and the war, which was henceforth confined to Sicily, miserably languished. Thrice was the Roman navy annihilated by storms at sea (255 B.C., 253 B.C., and 249 B.C.); and in spite of a series of unimportant successes by land, the Romans long found it impossible to make any impression on the great Carthaginian strongholds of Lilybæum and Drepanum, mainly on account of the brilliant strategy with which they were held in check by Hamilcar Barca, the father of Hannibal. At last, however, a great sea-fight took place off the Ægates isles (242 B.C.), in which a Roman fleet, commanded by the consul Lutatius Catulus, obtained a magnificent victory. The Carthaginian government, whose treasury was empty, and who had in vain tried to raise a state-loan in Egypt, could—for the present—continue the struggle no longer, and the whole of Sicily, except the territory of Hiero of Syracuse,

who had been a firm ally of the Romans, passed into the hands of the victors, who constituted it a Roman province, and placed it under the government of a prætor.—A lapse of 23 years occurred before the second Punic War began, but during that interval neither Romans nor Carthaginians had been idle. The former, with worse than 'Punic faith,' had bullied their weak and exhausted rival into surrendering Sardinia and Corsica, which, like Sicily, were transformed into a Roman province. In addition, they had carried on a series of Gallic wars in Northern Italy (231—222 B.C.), the result of which was the complete humiliation of the barbarian Boii, Insubres, &c., and the extension of Italy to its natural boundary—the Alps. On the eastern coast of the Adriatic also, the Romans made their power felt, by the vigour with which they suppressed Illyrian piracy (219 B.C.). Meanwhile, the descent of Hamilcar on the Spanish coast was followed, after some ineffectual opposition on the part of the natives, by the establishment of a new Carthaginian empire, or at least a protectorate, in the west; and thus, almost before the Romans were aware of it, their hated rival had made good her losses again, and was even able to renew the struggle in a more daring fashion than before. How confident the bearing of the Carthaginians had now become, may be seen from the fearless spirit in which they accepted the Roman challenge, and entered on the *second* Punic—or (as the Romans called it) the *Hannibalic*—War, the grand events of which were the crossing of the Alps by Hannibal, the terrible disasters of the Romans at Lake Trasimene (q. v.) and Cannæ (q. v.), and the final overthrow of Hannibal at Zama (q. v.), 202 B.C., by Scipio, which once more compelled the Carthaginians to sue for peace. It was with Carthage as with Samnium. The *second* war virtually sealed her fate, and the *third* displayed only the frantic heroism of despair. Her Spanish possessions, like her Sicilian, passed to the Romans (who formed out of them the provinces of *Hispania Citerior* and *Hispania Ulterior*); so did her protectorate over the Numidian sheiks. She was forced to surrender her whole navy (excepting ten triremes), and all her elephants, and to solemnly swear never to make war either in Africa or abroad, except with the consent of her vanquisher. In a word, the imperial supremacy of R. was now as unconditional in the western Mediterranean as on the mainland of Italy. Her relations, indeed, to the conquered Italian nationalities became much harsher than they had formerly been, for, after the first victories of Hannibal, these had risen against her. The Picentes, Bruttii, Apulians, and Samnites, were deprived either of the whole or the greater part of their lands—some communities were actually turned into serfs—the Greek cities in Lower Italy, most of which had also sided with Hannibal, became the seats of burgess-colonies. But the loss of life and of vital prosperity was frightful. 'Numbers of flourishing townships,' says Mommsen, '400 it was reckoned, were destroyed and ruined.' Slaves and desperadoes associated themselves in robber-bands, of the dangers of which an idea may be formed from the fact that in a single year (185 B.C.) 7000 men had to be condemned for robbery in Apulia alone; the extension of the pastures with their half-savage slave-herdsmen, favoured this mischievous barbarising of the land. But the exultation of victory closed the eyes and the ears of the Romans against every omen, and the perilous work of conquest and subjugation went on. During 201—196 B.C., the Celts in the valley of the Po, who, with the fiery unwisdom of their race, had recommenced hostilities at the very moment R. was freed from her embarrassments, were thoroughly subjugated; their territory was Latinised, but they themselves were declared incapable of ever acquiring Roman citizenship; and so rapidly did their nationality dissolve, that when Polybius, only 30 years later, visited the country, nearly all traces of Celtic characteristics had disappeared. The Boii were finally extirpated about 193 B.C.; the Ligurians were subdued 180—177 B.C.; and the interior of Corsica and Sardinia about the same time. The wars in Spain were troublesome and of longer duration, but they were not at all serious. The natives were indeed perpetually in arms, and the Romans suffered frequent defeats from their sudden and impetuous insurrections; but in the end the superior discipline of the legions always prevailed, and the fiery and chivalrous tribes had of course to make ignominious submission. So little reliance, however, could be placed on these forced submissions, that the Romans felt it necessary to hold Spain by military occupation, and hence arose the first Roman standing armies. Forty thousand troops were maintained in the Spanish peninsula year after year. The most distinguished successes were those achieved by Scipio himself, by Quintus Minucius (197—196 B.C.), by Marcus Cato (195 B.C.), by Lucius Æmilius Paullus (189 B.C.), by Caius Calpurnius (185 B.C.), by Quintus Fulvius Flaccus (181 B.C.), and by Tiberius Gracchus (179—178 B.C.).

Macedonian and Greek Wars.—The causes that led to the interference of R. in the politics of the East are too complicated to be given here, but the *Macedonian Wars* were owing immediately to the alliance formed by Philip V. of Macedon with Hannibal after the battle of Cannæ. Like the Samnite and Punic, the Macedonian Wars were three in number. The *first* (214—205 B.C.) was barren of results, mainly because the whole energies of R. were directed to Spain and Lower Italy; but the *second* (200—197 B.C.), though it lasted only a third of the time occupied by the first, taught Philip that another and not he must rule in Greece. The battle of *Cynoscephalæ* ('Dogs' Heads' Hills, a range in Thessaly) was followed by a treaty which compelled him to withdraw his garrisons from the Greek cities, to surrender his fleet, and to pay 1000 talents towards the expenses of the war. Philip was thoroughly quelled, and during the remaining 18 years of his life, he adhered (like old Hiero of Syracuse, though less sincerely) to his Roman alliance. But the miserable Ætolians, who had formed an alliance with R. against Philip, with even more stupidity than insolence, quarrelled in wanton jealousy with their powerful 'friends,' and persuaded Antiochus (q. v.) of Syria to come over seas to Thessaly, and fight them. A similar fate befell him to what had befallen Philip. After a war of three years, he found himself obliged to surrender all his possessions in Europe and Asia Minor, all his elephants and ships, and to pay 15,000 Euboic talents (£3,660,000) within 12 years. Next year the Ætolians were crushed, and a little later, the despicable quarrels between the Achaians and Spartans led to a general Roman protectorate over the whole of Greece.

Philip of Macedon dying (179 B.C.), was succeeded on the throne by his eldest son Perseus (q. v.), who resolved once more to try the fortune of war with the Romans; and in 172 B.C., the *third* and *last* Macedonian War began, the result of which, after four years of fighting, was the utter destruction of the Macedonian army at Pydna (168 B.C.) by the Roman consul Lucius Æmilius Paullus (q. v.), the capture of the king, who adorned the triumph of the conqueror, and the dismemberment of the Macedonian empire, which was broken up

into four oligarchic republics, the members of which were subjected to severe disqualifications; while in Greece itself, trials and executions for implication in the war of Perseus spread terror everywhere; the conspicuous 'patriots'—i. e., all who had made themselves notorious by their anti-Roman and Macedonian policy—were deported to Italy; further, the imperial republic stopped Antiochus Epiphanes in his career of Egyptian conquest, ordered him instantly to abandon his acquisitions, and accepted the protectorate of Egypt, which the grateful and frightened monarch offered her (168 B. C.). Even the allies of Rome—the Pergamese, the Rhodians, &c.—were treated with shocking harshness and injustice. We may here, for the sake of connection, anticipate the course of history, and mention the last *Greek* and *Punic* Wars. Both of these came to an end in the same year (146 B.C.). The former was caused by an expiring outburst of pseudo-patriotism in the Achaian League, consequent on the return of the exiles from Rome, and was virtually closed on the destruction of Corinth (q. v.) by the consul Mummius (q. v.). The latter was not so much a war as a bloody sacrifice to the genius of Roman ambition. After Hannibal's death, his party in Carthage seems to have recovered the ascendancy, and as coincident therewith, the commercial prosperity of the city began to revive, a bolder front was shewn in resisting the encroachments of Masinissa, the Numidian ruler, whom the Roman senate protected and encouraged in his aggressions. This was enough. Fierce old Cato only expressed the instinctive sentiment of the Roman burgesses, when he came to utter incessantly *Delenda est Carthago*, and in 149 B.C., the senate adopted his barbarous conviction. After a siege of three years, in which the inhabitants displayed superhuman energy and heroism, Carthage was stormed by Scipio Africanus Minor, and the Carthaginian empire vanished for ever from the earth.

Position of Rome at the close of the Punic Wars, and sketch of its subsequent Social Condition to the termination of the Republic.—'Polybius dates from the battle of Pydna the full establishment of the universal empire of Rome. It was in fact the last battle in which a civilised state confronted Rome in the field on a footing of equality with her as a great power; all subsequent struggles were rebellions or wars with peoples beyond the pale of the Romano-Greek civilisation—the barbarians, as they were called. The whole civilised world thenceforth recognised in the Roman senate the supreme tribunal, whose commissioners decided in the last resort between kings and nations; and, to acquire its language and manners, foreign princes and noble youths resided in Rome.' But contemporaneous with this enormous extension of power and authority in foreign lands, the national character underwent a complete and fatal alteration. The simplicity and stern integrity of life, the religious gravity of deportment, and the fidelity with which common civic and household duties were discharged—well expressed in the saying of Cato, that it was 'better to be a good husband than a great senator'—which in early times nobly distinguished the Roman burgess, had now all but disappeared. Those hardy virtues—frugality, temperance, justice, and rectitude—which, combined with courage and energy, had given the strength to the nation that made it great, required for their permanence the social conditions out of which they sprang. But the class of peasant proprietors who had laid the foundations of Roman greatness were either extinct or no longer what they once had been. The original causes of their social degradation have been already noticed, and here it is only necessary to say that the victories of R. abroad furthered rather than retarded that degradation. The long and distant wars made it more and more impossible for the soldier to be a good citizen or a successful farmer. The freedom and licentiousness of camp-life, the sweets of pillage and rapine, ever grew more pleasant to the Italian burgess and colonist; thus indolence, inaptitude, and spendthrift habits aided the greedy designs of the capitalists, and in most cases the paternal acres gradually slipped into the possession of the great landlords, who found it more profitable to turn them into pasture or cultivate them by gangs of slaves. The rise of the slave-system—though an inevitable result of foreign conquest—was, indeed, the most horrible curse that ever fell on ancient R., and the atrocities inflicted on its unhappy victims are far beyond the possibility of description; Mommsen does not exaggerate when he considers it probable that, 'compared with the sufferings of the Roman slaves, the sum of all negro suffering is but a drop.' If the Italian farmer honourably strove to retain his small farm, he was exposed to the competition of the capitalists who shipped immense quantities of corn from Egypt and other granaries, where slave-labour rendered its production cheap, and of course he failed in the unequal struggle. Not less pernicious was the change that passed over the character of the rich. We have already shewn how the old Roman patricians lost their exclusive privileges, how the plebeians gradually acquired a full equality with them, and how the germs of a new social aristocracy originated, based on wealth rather than pedigree, and comprising both plebeians and patricians. During the 4th and 3d centuries B.C., the political power of this order immensely increased. In fact, the whole government of the state passed into their hands. They became an oligarchy, and while it is not to be denied that they displayed extraordinary ability in the conduct of foreign affairs, the vices inseparable from oligarchic rule—selfishness, nepotism, and arrogance of which Scipio is a striking example gradually became rampant. Regarding themselves as the Roman community *par excellence*, and the poor burgesses as a mere *canaille*, whose wishes and interests were unworthy of a moment's consideration, they virtually relapsed into the exclusiveness of the ancient *populus*, with this difference for the worse, that their wealth, influence, and pride were a thousandfold greater than those of Coriolanus or Camillus. But far worse than even the nepotism and selfishness of the nobles was their ever-increasing luxury and immorality. When R. had conquered Greece, and Syria, and Asia Minor, the days of her true greatness were ended. The wealth that poured into the state coffers, thence to be (really if not formally) distributed among the clique of nobles, the treasures which victorious generals acquired, enabled them to gratify to the full the morbid appetites for pleasure engendered by exposure to the voluptuousness of the East. Such results were, it is true, not brought about in a day, nor without a resolute protest on the part of individual Romans. The attitude of Cato Major towards the Hellenising tendencies of his brother nobles was doubtless patriotic, and posterity has been generous in its laudation of his antique virtue; but Cato Major was nevertheless only a political fanatic and incarnate anachronism. So long as R. chose to subdue foreign nations, and to hold them by the demoralising tenure of conquest—i. e., as mere *provinces*, whose inhabitants, held in check by a fierce and unscrupulous soldiery (like the Kabyles of Algeria by the French, or, until recently, the Hindus by the British), neither possessed

political privileges nor dared cherish the hope of them—it was morally impossible for the citizens, either at home or abroad, to resume the simple and frugal habits of their forefathers. After Cato's time, things grew worse instead of better, nor from this period down to the final dissolution of the empire, was a single *radical* reform ever permanently effected. The momentary success of Tiberius, and of his far abler brother, Caius Gracchus (q. v.), in their desperate and revolutionary attempts to prevent the social ruin of the state, by breaking down the powers of the senate, redistributing the domain lands, reorganising the administration, and partially restoring the legislative authority of the popular assemblies, hardly survived their death; and the reaction that ensued proved that the senate, like the Bourbons, could learn nothing from adversity, and that the rabble of the city were incapable of elevation or generosity of political sentiment. Henceforth, the malversation of the public money by prætors and quæstors became chronic, and the moral debauchery of the mob of the capital by the largesses of ambitious politicians and the vile flattery of demagogues, complete. The old Roman faith, so deep, and strong, and stern, disappeared from the heart. The priests became Pharisees, the nobles 'philosophers' (i. e., unbelievers), their wives practisers of oriental abominations under the name of 'mysteries;' while the poor looked on with unmeaning, yet superstitious wonder at the hollow but pompous ceremonies of religion. It would serve no useful purpose to dwell longer on these aspects of Roman society, and we now turn to sketch in a few words the course of outward events to the close of the republic.

From the Destruction of Carthage to the Termination of the Republic.—We have already alluded to the wars waged in Spain during the first half of the 2d c. B.C. The humane and conciliatory policy pursued towards the natives by Tiberius Sempronius Gracchus, father of the ill-fated tribunes, brought about a peace, 179 B.C., that lasted 25 years; but in 153 B.C., a general rising of the Celtiberians took place, followed by another on the part of the Lusitanians of Portugal. The struggle maintained by these gallant barbarians against their mighty oppressor lasted, with intervals of peace, for the space of 20 years, but ended, in spite of gleams of brilliant success, as such contests invariably do, in the final overthrow of the undisciplined and uncivilised combatant. All the valour of the shepherd-warrior, Viriathus (q. v.), even if the assassin's steel had spared his life, would not have prevented the annexation of Lusitania to the Roman empire, nor did the unsurpassable heroism of the besieged Numantines avail to baffle the military skill of the younger Scipio.

Towards the conclusion of the Numantine War occurred the first of those horrible social outbreaks known as 'servile' or 'slave' wars, which marked the later ages of the republic. The condition of the slaves has been already referred to; but what aggravated the wretchedness of their lot was the fact that most of them had been originally freemen —not inferior in knowledge, skill, or accomplishments to their masters, but only in force of character and military prowess. The first slave insurrection broke out in Sicily, 134 B.C., where the system was seen at its worst. Its leader was one Eunus, a Syrian, who, mimicking his native monarch, took the title of King Antiochus. The suddenness and barbaric fury of the revolt for a time rendered all opposition impossible. The slaves overran the island, like demoniacs let loose; and routed one Roman army after another. But a slave insurrection has no aim beyond immediate revenge, and when the first wild paroxysms of ferocity are over, it becomes powerless, more even from a moral than a physical exhaustion, and can be quelled with ease. In 132 B.C., the consul Publius Rupilius restored 'order' in the island. In the East, fortune continued to smile upon the Roman arms. Attalus III., Philometer, a villainous despot of the true oriental stamp, who massacred or poisoned every one that ventured to give him advice, dying 133 B.C., bequeathed his client-kingdom of Pergamus to its protector—R.; and after a fierce struggle with an ambitious pretender called Aristonicus, the Romans obtained possession of the splendid bequest, and formed it into the province of Asia, 129 B.C.

We may here enumerate the different provinces into which the Roman senate divided its foreign conquests, in the order of their organisation. 1. Sicily, 241 B.C.; 2. Sardinia and Corsica, 238 B.C.; 3. Hispania Citerior, and 4. Hispania Ulterior, 205 B.C.; 5. Gallia Cisalpina, 191 B.C.; 6. Macedonia, 146 B.C.; 7. Illyricum, *circa* 146 B.C.; 8. Achaia (or Southern Greece), *circa* 146 B.C.; 9. Africa (i. e. the Carthaginian territory), 146 B.C.; 10. Asia (kingdom of Pergamus), 129 B.C. A few years later, 118 B.C., an 11th was added by the conquest of the southern part of Transalpine Gaul, and was commonly called, to distinguish it from the rest of the country, 'the Province;' hence the modern *Provence*.

In Africa, the overthrow of Jugurtha (q. v.), 104 B.C., by the consul Marius, added yet further to the military renown and strength of the republic. Meanwhile, from a new quarter of the world, a gigantic and unforeseen danger threatened the Roman state. North of the Alps there had long been roaming in the region of the Middle Danube an unsettled people called the CIMBRI (q. v.), whose original home was probably the north-west of Germany. They first came into collision with the Romans in Noricum, 113 B.C.; after which they turned westward, and poured through the Helvetian valleys into Gaul, where they overwhelmed alike the native tribes and the Roman armies. At Arausio (Orange) on the Rhône, 105 B.C., a Roman army of 80,000 was annihilated; but instead of invading Italy, the barbarians blindly rushed through the passes of the Pyrenees, wasted precious months in contests with native tribes of Spain as valiant and hardy as themselves, and gave the Romans time to recover from the effects of their terrible defeat. Marius, who had just returned from his Numidian victories, was reappointed consul; and at Aquæ-Sextiæ (Aix, in Dauphiny), he literally exterminated the dreaded foe, 102 B.C. Next year, near Milan, the same doom befell another northern horde—the Teutones, who had accompanied the Cimbri in their irruption into Spain; but on their withdrawal, had parted from their associates in Gaul, forced their way back through Switzerland, and descended into Italy by the Tyrolese valleys. In the same year a second insurrection of the slaves in Sicily, which had reached an alarming height, was suppressed by the consul Marcius Aquillius.

For the next 10 years the internal history of R. is a scene of wild confusion and discord. Marius, an admirable soldier, but otherwise a man of mediocre talents, and utterly unfit to play the part of a statesman, was the idol of the poor citizens, who urged him to save the state from the rapacious misgovernment of the rich. His attempts were pitiable failures; the brave honest soldier fell into the hands of unscrupulous demagogues like Glaucia and Saturninus, and sullied the laurels he had won in war by associating with men who did not hesitate to assassinate a political opponent. Not less fruitless was the wise and patriotic effort of Livius

Drusus—'the Gracchus of the aristocracy'—to effect a compromise between the privileges of the rich and the claims of the poor. The oligarchic party among the former, i. e. the senate, were enraged by his proposition to double their numbers by the introduction of 300 equites; the latter by his offer to the 'Latins' and 'Allied Italians' of the Roman franchise. Drusus fell 91 B. C., by the steel of a hired bravo. Hardly a year elapsed before the whole of the subject 'Italians'—i. e., the Marsians, Pelignians, Marrucinians, Vestinians, Picentines, Samnites, Apulians and Lucanians—were up in wild and furious revolt against R.; and, though the rebellion was crushed in less than two years by the superior generalship of Marius, Sulla, and Pompeius Strabo (father of the 'great' Pompey), the insurgents virtually triumphed; for the promise which Drusus had held out to them of the 'Roman franchise,' was made good by the *Lex Plautia Papiria* 89 B. C. Yet the cost was terrible. It is calculated that 300,000 men—the flower of R. and Italy, perished in the struggle; nor was even this tremendous holocaust sufficient to appease the Fates. The jealousy that had long existed on the part of Marius towards his younger and more gifted rival, Sulla (q. v.), kindled into a flame of hate when the latter was elected consul 88 B. C., and received the command of the Mithridatic War—an honour which Marius coveted for himself. Then followed the fearful years of the 'civil wars' between the two chiefs, 88—82 B. C., when blood was spilt like water; and proscriptions and massacres were the order of the day. It was a 'Reign of Terror'—surpassing even the excesses of the French Revolutionists. Sulla, the leader of the aristocracy, which was nominally the party of order, triumphed, but the ferocious energy displayed by the revolutionists convinced him that the 'Roman franchise' could never again be safely withdrawn from the 'Italians;' and Roman citizens, therefore, they remained till the dissolution of the empire; but, on the other hand, his whole legislation was directed towards the destruction of the political power of the burgesses, and to the restoration to the senatorial aristocracy and priesthood of the authority and influence they had possessed in the times of the Punic Wars. That his design was to build up a strong and vigorous executive cannot admit of doubt, but the rottenness of Roman society was beyond the reach of cure by any human policy. It would be hopeless in our limits to attempt even the most superficial sketch of the complicated history of this period, which, besides, will be found given with considerable fulness of detail in the biographies of its leading personages, SERTORIUS, LUCULLUS, CRASSUS, POMPEY, MITHRIDATES, CÆSAR, CICERO, CATILINE, MARK ANTONY, LEPIDUS, CLEOPATRA, CLODIUS, BRUTUS, CASSIUS, CATO, and AUGUSTUS. The very utmost we can attempt is to enumerate results.

Abroad the Roman army continued as before to prove irresistible. About 13 years after the extermination of the northern barbarians, the Cimbri and Teutones, or in 88 B.C., broke out in the far east the first of the 'Mithridatic Wars,' which, like the Samnite, Punic, and Macedonian Wars, were three in number. Begun by Sulla, 88 B. C., they were brought to a successful close by Pompey, 65 B. C., although the general that had really broken the power of Mithridates was Lucullus. The result was the annexation of the sultanate of Pontus, as a new province of the Roman republic. Next year, Pompey marched southward with his army, deposed Antiochus Asiaticus, king of Syria, and transformed his kingdom also into a Roman province, while in the following year (63 B. C.) he reduced to a state of dependence Phœnicia, Cœle-Syria, and Palestine, storming Jerusalem, and, to the horror of the Jews, violating their Holy of Holies. But what a terrible commentary it is upon these glittering triumphs to remember that during the same year there was hatched at R. the Conspiracy of Catiline (q.v.), which, if it had not been crushed by an extraordinary display of decision on the part of the consul Cicero, would have placed at least the city of R. at the mercy of a crew of aristocratic desperadoes and cutthroats. One thing now becomes particularly noticeable, viz., the paralysis of the senate—that 'governing board' as Mommsen calls it, that had once been the mightiest power in the world. In spite of all that Sulla did to make it once more the governing body in the state, the power passed out of its hands. Torn by wretched jealousies, spites, piques (personal and partisan), it could do nothing but squabble or feebly attempt to frustrate the purpose of men whom it considered formidable. Henceforth the interest as well as the importance of Roman history attaches to individuals, and the senate sinks deeper and deeper into insignificance, until at last it becomes merely the obsequious council of the emperors. The famous coalition of Crassus, Pompey, and Cæsar (known as the *First Triumvirate*), which dates from the year 60 B. C., proves how weak the government and how powerful individuals had become; and the same fact is even more dismally brought out by the lawless and bloody tribunates of Clodius and Milo (58—57 B. C.), when R. was for a while at the mercy of bravos and gladiators. The campaigns of Cæsar in Gaul (58—50 B. C.), by which the whole of that country was reduced to subjection; his rupture with Pompey; his defiance of the senate; the civil wars; his victory, dictatorship, and assassination; the restoration of the senatorial oligarchy; the second triumvirate, composed of Antony, Lepidus, and Octavian; the overthrow of the oligarchy at Philippi; the struggle between Antony and Octavian; the triumph of the latter, and his investment with absolute power for life (29 B. C.), which put an end at least to the civil dissensions that had raged so long (and was therefore so far a blessing to the state), are described in the biographical articles already referred to.

THE ROMAN EMPIRE.—When Augustus had gathered up into himself all the civil and military powers of the state, its political life was at an end; henceforth the voices of the citizens are dumb, and only the rude clamour of the legions or the Prætorians (q. v.) is heard, as emperors rise and fall. It is, indeed, amazing to consider how long brute force managed to keep under the elements of anarchy and dissolution in the empire; but it must be remembered that it was the East that ruined R., and not R. the East. Even in the worst days of the republic, the Roman administrators of the provinces were acknowledged to be less unjust, ravenous, tyrannical, and cruel than the native princes and sultans; and the servile myriads of Asia Minor and Syria witnessed the deposition of their dynasts without a shadow of regret—sometimes even with a cry of joy. The Romans had therefore comparatively little difficulty in retaining and even increasing their eastern conquests, while the superior discipline of their well-trained soldiery enabled them to repel and subdue even the intrepid barbarians of the North, though singly these were probably more gallant men than the rank and file of the imperial legions. But no military prowess, however great, will, beyond a certain time, serve to keep a nation alive that is otherwise moribund; and even Christianity, with all its antiseptic and revivifying influences, came

too late to reanimate the national life of the empire. When Augustus died (14 A.D.), the Roman empire was separated in the north from Germany by the Rhine, but it also included both Holland and Friesland; from about the Lake of Constance it ran along the Danube to Lower Mœsia, though the imperial authority was far from being firmly established there. In the east, the boundary-line was, in general, the Euphrates; in the south, Egypt, Libya, and, in fact, the whole of Northern Africa, as far west as Morocco, and as far inland as Fezzan and the Sahara, acknowledged Roman authority. The Roman franchise was extended to transmarine communities, and in the western provinces especially it became quite common. To keep this enormous territory, containing so many different races, quiet, an army of 47 legions and as many cohorts was maintained, most of whom were levied among the newly-admitted burgesses of the western provinces. The reigns of Tiberius (q. v.), Caligula (q. v.), Claudius (q. v.), Nero (q. v.), Galba (q. v.), Otho (q. v.), and Vitellius (q. v.), present little of any moment in a general survey of the external history of the empire, though the chronicle of their lives—those of Galba and Otho, perhaps, excepted—has all the horrible and revolting interest that attaches to records of conspiracy, assassinations, poisonings, massacres, lust, debauchery, and delirious madness. The most notable incident of this period is probably the concentration of the Prætorian Guards in the vicinity of R. during the reign of Tiberius, which Niebuhr even pronounces 'the most momentous event in the history of the emperors;' and not without reason, for, until their dissolution by Diocletian, they were the real sovereigns of the empire. In Nero's time, Armenia was wrested from the Parthians, and only restored to them on condition of their holding it as a 'fief' of the empire; the Roman authority in England was likewise extended as far north as the Trent; and a great rebellion in Gaul (not, however, against R., but only against Nero), headed by Julius Vindex, a noble Aquitanian and a Roman senator, was crushed by T. Virginius Rufus, the commander of the Germanic legions. During the profound peace that the empire had enjoyed everywhere, except on its frontiers—since the usurpation of the imperial authority—its material prosperity had greatly increased. The population was more than doubled; the towns became filled with inhabitants, and the wastes were peopled, wherever, at least, the Publicani (q. v.) or farmers-general had not got the land into their rapacious hands; but the immorality of the rich, especially among the females, became yet worse than before, and virtuous men actually preferred concubinage with a slave, to marriage with a free-born Roman lady.

With the accession of Vespasian (q. v.) a better era commenced, which, if we except the reign of Domitian, continued uninterrupted for a space of 100 years, comprising the reigns, besides those mentioned, of Titus (q. v.), Nerva (q. v.), Trajan (q. v.), Hadrian (q. v.), Antoninus Pius (q. v.), and Marcus Aurelius (q. v.). These were all men of fine and honourable character—some, as e. g., Trajan, Hadrian, and Marcus Aurelius, were really illustrious rulers, worthy of the best days of Rome. Under all of them the provinces were better governed, the finances better administered, and public morals wonderfully improved. Nothing, indeed, is more clear than that, after the time of Vespasian, that *restaurator rei publicæ*, as he has been justly called, the worst days of Rome (in a moral point of view) were over. Never again did she give way to the horrible sensuality, gluttony, and profligacy of the 1st century. Bad emperors she had as well as good, but they did not again succeed in corrupting their age. Blood, indeed, was shed freely enough, hostilities on the frontiers were as frequent as ever, and the violence and selfishness of military ambition were things that paganism did not seek, and had not the power, to quell; but the wild abyss of anarchy into which the empire latterly fell is less dreadful than the saturnalia of vice that filled the soul of Juvenal with indignation in the days of Domitian. How far the change was due to the influence of the ever-extending Christian religion, it is impossible to tell; but that Christianity did send a reinvigorating breath of new life through the old decaying body of the state is beyond all dispute, and is written on the very face of the history of the first centuries. The chief military events, from the days of Vespasian to those of Marcus Aurelius, are the final conquest of Britain by Agricola (q. v.), the final conquest of the Dacian monarchy, the victorious invasion of Parthia and of Northern Arabia; and the conquest of the valley of the Nile as far south as Upper Nubia, by Trajan; the chastisement of the Marcomanni, Quadi, Chatti, &c., by Marcus Aurelius. Hadrian's long rule of 21 years was peaceful, but is memorable as the most splendid era of Roman architecture. The reigns of Commodus (q. v.), Pertinax (q. v.), and Didius Julianus (q. v.) were insignificant, except in so far as they shew us the wretched confusion into which the administration of affairs inevitably fell when bad, or hated, or feeble rulers were invested with the purple. Able generals, respectable jurists, honourable senators are not wanting, but their influence is personal and local. The reign of Septimius Severus (193—211 A.D.) is memorable as marking the first real change in the attitude of the emperors towards Christianity. The new religion was beginning to make itself felt in the state; and Severus, who was a Carthaginian, while his wife was a Syrian, may have felt a special interest in a faith that like themselves was of Semitic origin. At all events it was taken under the imperial protection, and began to make rapid way. Caracalla (q. v.) and Elagabalus (q. v.) are perhaps the worst of all the emperors in point of criminality; but the mad brutality of the one and the monstrous debauchery of the other were purely personal affairs, and were regarded with horror by the citizens of the empire. The reign of Alexander Severus is marked by the downfall of the Parthian dynasty of Persian kings, and the rise of the native Sassanidæ (q. v.), which, as Niebuhr observes, 'was one of the unluckiest things that could have happened to the Roman empire,' for the latter proved far more formidable enemies than the Parthian rulers. After the assassination of Severus (235 B.C.) followed a period of confusion, bloodshed, and general mismanagement. The names of Maximin (q. v.), Maximus (q. v.), Balbinus (q. v.), Gordianus (q. v.), and Philip (q. v.), recall nothing but wretched quarrels, often ending in assassination. Then followed 'the beginning of the end.' The whole of Europe beyond the Roman frontier—the mysterious North—began to ferment. The Franks shewed themselves on the Lower Rhine, the Swabians on the Maine; while the Goths burst through Dacia, routed the forces of Decius (q. v.), and slew the emperor himself at Mount Haemus, crossed the Euxine, and ravaged the whole northern coast of Asia Minor. A little later—during the reigns of Valerian (q. v.), Gallienus, and the so-called *Thirty Tyrants*—the empire is nothing but a wild distracted chaos, Franks, Alemanni, Goths, and Persians rushing in from their respective quarters, like vultures scenting prey. The Goths swept over the whole of Achaia, pillaging and burning

the most famous cities—Athens, Corinth, Argos, &c.; while the Asiatic hordes of Sapor committed even greater havoc in Syria and Asia Minor, and but for the courage and skill of Odenathus, husband of Zenobia (q v), who had built up a strong independent kingdom in the Syrian desert, with Palmyra for its capital, might have permanently possessed themselves of the regions which they merely devastated With Claudius Gothicus (268—270 B C), the fortunes of the empire once more begin to brighten By him and his successors Aurelian (q v), Probus (q v), and Carus, the barbarians of the north and north west as well as the Persians in the east, were severely chastised Nay, when Diocletian obtained the purple (284 A D) it seemed as if the worst were over, and the empire might still be rescued from destruction, but his division of the empire into East and West, with separate *Augusti* and assistant *Cæsars*—though it sprang from a clear perception of the impossibility of one man administering successfully the affairs of so vast a state—led to those labyrinthine confusions and civil wars, in which figure the names of Maximian (q v), Constantius (q v), Galerius (q v) Maxentius (q v), Maximin (q v), Licinius (q v), and Constantine (q v) and which were only brought to a close by the superior genius of the last mentioned Under Constantine (324—337 A D) as all the world knows, occurred the greatest revolution in Roman history since the birth of Christ viz, the establishment of Christianity as the religion of the state He also transferred the seat of government from Rome to Byzantium on the Bosporus where he founded a new city and named it after himself But no sooner was the great statesman dead than the mutinous discords that he had kept under by the vigour of his rule broke loose, the empire underwent a triple division among his sons, and then Constantius (q v) the youngest ere long became sole ruler he failed to display the genius of his father and in his repeated campaigns against the Persians reaped nothing but disaster and disgrace But the political fortunes of the empire now possess only a secondary interest, it is the struggle of the Christian sects and the rise of the Catholic Church that mainly attract the attention of the historian Here, at least we behold the signs of new life and zeal enthusiasm, and inward strength of soul that no barbarism could destroy Christianity came too late to save the ancient civilisation, but it enabled the Roman world to endure three centuries of utter barbarism, and afterwards to recover a portion of the inheritance of culture that it once seemed to have lost for ever Julian's attempt to revive paganism was a lamentable anachronism, but his efforts when governor of Gaul under his kinsman Constantius, to repel the incessant incursions of the Franks and Alemanni, displayed a fine valour and generalship, and were crowned with success The judgment of the poet Prudentius on the apostate is that of posterity *Perfidus ille Deo, sed non et perfidus orbi* But after the death of Julian, the signs of the approaching dissolution of the empire became more unmistakable Yet the great state was, if we may so speak, loath to die, and again and again in her death agony, she put forth a momentary strength that amazed her foes, and taught them that even the expiring struggles of a giant were to be feared Valentinian (q v), Gratian (q v), and Theodosius (q v) were rulers worthy of better times. The last mentioned is even known to history as the 'Great' But they fought against destiny, and their labour was in vain Already swarms of ferocious Huns (q v) from the east had driven the Goths out of Dacia, where they had long been settled, and forced them to cross the Danube into the Roman territory, where the cruelty and oppression of the imperial officers goaded the refugees into insurrection, and in their fury, they devastated the whole east from the Adriatic to the Euxine Theodosius indeed subdued and even disarmed them, but he could not prevent them from drawing nearer to the heart of the empire, and already they are found scattered over all Mœsia, Servia, and Northern Illyricum Hardly was Theodosius dead when they rose again, under their chief, Alaric (q v), against Honorius, emperor of the West Rome was saved (for the moment) only by the splendid bravery and skill of Stilicho (q v), the imperial general, but after his assassination, the barbarians returned sacked the city (410 B C), and ravaged the peninsula Three years earlier, hordes of Suevi, Burgundians Alemanni, Vandals, and Alans burst into Gaul (where the native Celts had long been largely Romanised in language and habits), overran the whole and then penetrated into Spain, where a Vandal empire was rapidly set up It is utterly impossible (within our limits) to explain the chaotic imbroglio that followed in the West—the struggles between Visigoths and Vandals in Spain, between Romans and both, between usurpers of the purple and loyal generals in Gaul—the fatal rivalries of those otherwise noble and gifted men—Boniface, governor (*comes*) of Africa, and Ætius, governor of Gaul which led to the invasion of Africa by Genseric (q v), and its devastation from the Straits of Gibraltar to Carthage (429 A D). While such was the state of affairs in the West, things were not a whit better in the East There the Huns, from mere love of havoc, had reduced vast regions to an utter desert for nearly 50 years, indeed, the little ferocious demons had rioted in destruction At last, a trivial quarrel sent them into Gaul but somewhere in Champagne, they were routed with great slaughter (451 A D) by a combined force of Visigoths Burgundians, Franks, and Roman mercenaries under Ætius and Theodoric, king of the Goths and in spite of their successful invasion of Italy in the following year, their strength was permanently broken, and henceforth they play an insignificant part in history But Ætius, the only man who could have decently propped up the wretched ruin called the Western Empire, was assassinated by his contemptible sovereign Valentinian, whose own outrages led to his murder too; while his widow, Eudoxia to be revenged on his murderer and successor, Petronius Maximus, invited Genseric the 'scourge of God,' over from Africa, and exposed R to the horrors of pillage for 14 days Ricimer, a Suevic, next figures as a sort of governor of the city, and what relics of empire it still possessed, for Gaul, Britain, Spain, Western Africa, and the islands in the Mediterranean, had all been wrested from it While Majorian—the last able emperor—lived, Ricimer's position was a subordinate one, but, thenceforth, the western emperor merely was an emperor in name—a *roi fainéant*—while the real sovereignty was exercised by this Suevic *Maire du Palais*, who was succeeded in his functions by the Burgundian King Gundobald, and the latter again by Orestes, in whose time the final catastrophe happened, when Odoacer (q v), placing himself at the head of the barbarian mercenaries of the empire, overthrew the last, and the most ridiculous, occupant of the throne of the Cæsars (476 A D), who, by a curious coincidence, bore the same name as the mythical founder of the city—Romulus See, besides the ancient histories, of Polybius, Livy, Sallust, Tacitus, &c, the modern histories of Gibbon, Niebuhr, Arnold, Merivale, and Mommsen.

ROME, the capital of ancient Italy, stood on the left bank of the Tiber, about 16 miles from the sea. The legend of its origin belongs to Roman history, and is discussed partly under that heading, and partly in the article ROMULUS. It was built at first in the form of a square (*Roma Quadrata*), and gradually extended, until, in the reign of Servius Tullius, it embraced one after another the famous seven hills—viz., the Palatine, Capitoline, Quirinal, Cælian, Aventine, Viminal, and Esquiline. Servius Tullius (according to the legend) so extended the *pomœrium* as to make the sacred enclosure of the city identical with its walls. After its first destruction in 390 B.C. by the Gauls, it was hastily rebuilt without respect to order, and with narrow irregular streets. At the close of the wars against Carthage, Macedonia, and Syria, public buildings and private houses of great architectural beauty were added; and under Augustus, improvements of a similar kind were made, while the mean and narrow streets were allowed to stand. In the reign of Nero, 64 A.D., two-thirds of the city were destroyed by fire, a catastrophe which furnished that emperor with the opportunity of gratifying his architectural predilections, in widening and straightening the streets, and in restricting the height of the houses, of which a certain part was built of fireproof stone from Gabii and Alba. Although it had long outgrown the limits prescribed by Servius Tullius, still the walls of that king marked the extent of R. properly so called down to the 3d c. A.D. Under Aurelian, however, the need of fortifications led to the construction of new walls, which took in the city of Servius Tullius with all the suburbs, such as the Mons Janiculus on the right of the Tiber, and the Pincian on the left. These walls, begun 271 A.D., were completed by the next emperor, Probus, were eleven miles in circumference, and were afterwards restored by Honorius, and partially rebuilt by Belisarius.

Extent and Population of Rome. Under Servius Tullius, the walls were seven miles in circumference, but the space which they comprised was not entirely occupied by buildings. Under Aurelian, the new walls were 11 miles in circumference, and the city went on extending until it reached a circumference of 13 miles under Vespasian. The population at any given period cannot be exactly determined. According to the *Monumentum Ancyranum*, the *plebs urbana* under Augustus amounted to 320,000; with the addition of women, senators, and knights, the inhabitants must have numbered about 650,000; while the slaves, who cannot have been less numerous than the free population, must have given an aggregate of at least 1,300,000. Considering the enlargement of the city under Vespasian, we may safely set its population down at not less than two millions in his reign.

The Walls and Gates.—The first wall, that attributed to Romulus, embraced merely the Palatine, and was pierced by three gates. The larger wall of Servius Tullius does not appear to have been continuous, but only to have connected the seven hills by fortifications drawn across the narrow valleys intervening. According to Pliny, there were 37 gates in this wall. Subsequent to the walls of Servius were those of Aurelian, which, with the exception of the part beyond the Tiber, are the same as those which surround the modern city. They were divided by 14 gates. The Tiber was crossed by eight bridges.

In the interior of the city were several open spaces of ground, paved with stones, which were used as places of business or as market-places, and were called *fora* (see FORUM.) Besides these, there were other open spaces of much larger extent, which were grass-grown, and set with trees and works of art. Of these, which were called *campi*, and were used by the people in their exercises and amusements, the chief was the Campus Martius. Surrounding these fora and campi were the private and public buildings of R., which were arranged in streets and districts. The chief street was the celebrated Via Sacra, remains of which are still to be seen in the Forum of modern Rome.—R. contained no fewer than 400 temples, the oldest being the temple of the Feretrian Jupiter, on the Capitoline, which was built, according to tradition, by Romulus, and restored by Augustus. The most famous in history, and the most magnificent in architecture, was the Capitolium, placed on the summit of the Capitoline (see CAPITOL). The only other temple requiring special mention was the Pantheon (q. v.), built by Agrippa, 57 B.C. It is still standing.—For other striking features of the ancient city, see CIRCUS, AMPHITHEATRE, BATH, BASILICA.

R. also abounded in covered walks, supported by columns, and open on one side. These were known as *porticus*, and were frequented for the purposes of recreation, or of transaction of business. They were in many cases adorned with paintings and other works of art, and furnished with libraries.—More peculiar to ancient Rome, however, were the triumphal arches. See ARCH, TRIUMPHAL.—The great prison of R. was the Carcer Mamertinus, built by Ancus Martius on the slope of the Capitoline, which overhangs the Forum. Servius Tullius added to it a subterranean dungeon, 12 feet underground, walled and arched over with masonry.—In addition to the prisons, we may mention the barracks (*castra*), such as the Castra Prætoria, built by the Emperor Tiberius for the imperial guards; and the Castra Peregrina, where the foreign troops were quartered; the aqueducts (see AQUEDUCT); and the sewers (see CLOACA MAXIMA).

R. also abounded in palaces (*palatia*). Of these, the Palatium, or imperial palace, fronting the Forum, was so enlarged by Augustus, that from being the private house of Hortensius the orator, it became the imperial residence. Nero built two still more splendid palaces, one which covered the whole Palatine Hill and part of the Esquiline, and was burned down in the great fire; and one which replaced the other. Many of the private palaces were also on a magnificent scale.—On the hills around the city were laid out *horti*, or parks and gardens, and were adorned with handsome buildings and works of art.—R. was also rich in sepulchral monuments. See ROMAN ARCHITECTURE.—In addition to these imperial or private mausolea, columns were also erected to the more illustrious of the Romans, such as the Columna Rostrata, in honour of the consul C. Duilius for his victory over the Carthaginian fleet; the Columna Trajani, in the Forum; and the Columna Antonini Pii, in the Campus Martius.—Obelisks (q. v.), mostly transported from Egypt, occupied prominent parts of the city, the largest being that transferred from Heliopolis to Alexandria by Constantine, and thence to R. by his son Constantius, and placed by him in the Campus Martius.

Modern Rome occupies the plain on each side of the Tiber and the slopes of the seven hills. Its geographical position at the Observatory of the Collegio Romano is lat. 41° 53′ 52″ N., long. 12° 28′ 40″ E. of Greenwich, and its height above the level of the sea, on the Tiber, under the Ælian Bridge, is 20 feet. Its pop. at Easter 1863 was 201,161, exclusive of strangers. The number of priests—including 34 cardinals and 36 bishops—and friars is 4463, and

of nuns 2031 It contains 4490 Jewish residents, who are still compelled to inhabit a particular quarter, called the Ghetto Resident Protestants number only 311

The city is built on marshy ground, and is divided by the Tiber into two very unequal parts, that on the left bank being R. Proper, and that on the right bank being the Leonine city, or Trastevere Its walls, 12 miles in circuit, and containing 16 gates, of which 4 are built up, enclose a space of which little more than one third is inhabited, the greater part to the south of the Capitol being cultivated as gardens or vineyards The site of the ancient Campus Martius constitutes the lower and most densely peopled part of the town, in which all the trade is carried on Its central part is crossed by the Corso a street about one mile long and running from the Piazza del Popolo or great northern entrance of R, to the Palazzo di Venezia, at the foot of the Capitol From the Piazza del Popolo a handsome open space with an obelisk from the Temple of the Sun at Heliopolis in the middle, branch out to the right and left of the Corso, the Piazza di Spagna the favourite quarter of foreigners, and the Ripetta More than half way up the Corso, and to the right runs the wide street or Strada del Gesù leading to the noble church and convent of that name the chief residence of the order of the Jesuits On the side of the Corso, the buildings are regular and substantial, and consist of palaces such as the Borghese, the Ruspoli the Chigi and others besides many churches Between the Corso and the Tiber, to the west the streets are irregular, densely peopled with artisans tradesmen and consisting mainly of mean looking shops and dwellings of a low class In this quarter is the University La Sapienza between which and the Corso is the Rotunda or Pantheon South of Ponte Sisto, on the left bank of the Tiber and winding round the western base of the Capitol to the foot of the Palatine is the Ghetto or Jews Quarter, consisting of narrow dirty alleys with rows of high old houses Still further south and on the left bank of the Tiber runs a series of narrow streets as far as the Palatine containing some of the oldest churches in R, such as the Santa Maria in Cosmedin built in the 3d century Beyond this extend to the south east the Aventine Palatine, and Caelian hills which are covered with gardens, vineyards and orchards besides churches convents, and ruins At the eastern extremity of the Caelian stands the magnificent Basilica of San Giovanni in Laterano To the south of the Aventine, and between it the river, and the walls, are the Prati del Popolo Romano, forming part of a large space of low lying cultivated ground Near the Prati lies the Protestant Cemetery

On the slope of the Pincian and Quirinal hills and covering part of the plateau which joins all the eastern hills of R, lies the upper town, consisting mainly of palaces, villas, churches, convents and other buildings on a large scale It abounds with ample courts and gardens, and is crossed by two long streets, which intersect each other at right angles on the crest of the Quirinal The Pincian is laid out in fine walks, which are the favourite promenade of the Romans, while between the Pincian and the Quirinal stands the great Barberini Palace On the summit of the Quirinal is the famous pontifical palace and garden, and in the square before the palace are the two colossal statues of Castor and Pollux, with their horses, whence the hill receives its other name of Monte Cavallo On the Esquiline, which here joins the Quirinal, and forms the eastern extremity of the city, stands the magnificent church of St Maria Maggiore; beyond it to the north, east, and south, the Esquiline is entirely covered with gardens, villas, and fields, with here and there a church The principal buildings on the Capitol are three palaces, the work of Michael Angelo, which form three sides of a square, in the centre of which stands the equestrian statue of M. Aurelius Antoninus One of the palaces is the Capitoline Museum one of the finest collections of statuary and sculpture in Italy

The third great division of the modern city lies on the right bank of the river, and is subdivided into two parts the Vatican (otherwise called Il Borgo) and the Trastevere Divided from the latter by an inner wall the Borgo or Leonine city occupies the space between the bridge of St Angelo and the Piazza of St Peter's Its chief buildings are the palace of the Vatican (q v) and the Basilica of St Peter's (q v) Besides the Vatican and St Peter's, the Leonine city contains the great hospital of the Santo Spirito, which accommodates annually 13,500 patients labouring under all diseases, whether mental or bodily The Castle of St Angelo, with massive circular tower, called from its founder the Mole of Hadrian is surrounded with ramparts, ditches and bastions, mounted with cannon, and forms the citadel of Rome

To the south of the Borgo, and between the Janiculum and the Tiber, is the Trastevere, properly so called The Janiculum, a straight ridge, about a mile and a half long from north to south, rises about 300 feet above the level of the river. The northern half of its length is occupied by the long street called the Lungara, running closely parallel to the Tiber which, at the south in extremity of the Lungara makes a bend to the east and bounds the great part of the Trastevere district On the Janiculum is the Villa Spada, near the gate, outside of which is the Villa Pamfili a favourite promenade of the Roman youth On the same hill, the fountain called Acqua Paola the largest in Rome, occupies a commanding site, and is seen from a distance, resembles a triple triumphal arch, through which streams of water run

The churches of which there are upwards of 300, form a notable feature in R from their architecture, their paintings and other decorations So too are the palaces of the aristocracy, which are often of great magnitude, with vast courts and precious apartments Of even better style as residences are the villas, both within and without the walls while the handsome fountains, of which there are at least 12 principal ones impart a cheerful and refreshing aspect to the city There are three main aqueducts, which keep R supplied with abundance of water the Acqua Vergine, the Acqua Felice (the ancient Acqua Marcia and Claudia), and the Acqua Paola (the ancient Alsietina)

R is on the whole a healthy city, except at the close of summer and the beginning of autumn, when the malaria is prevalent The Trastevere is its most uniformly healthy district, the inhabitants of which are superior in physical development to those of the other parts The neighbourhoods of the Pincian and the Quirinal, particularly the former, are most frequented by Englishmen The trade of the city is insignificant, consisting of a few trivial manufactures of hats silk scarfs, gloves, artificial feathers, false pearls, mosaic trinkets, &c, and of such articles as artists need and visitors fancy. The only great manufacture, if it can be called so, is that of pictures, original and copied, for the painting of these, R offers not only the advantage of numerous galleries of art, but purity of sky, and a steady light daily over nearly the whole year. The worst feature of R. is its dirtiness, arising

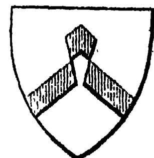
from defective sanitary and police regulations; but in this respect the town is improving under the supervision of the French garrison.

ROME, a township and village of New York, U.S., on the Mohawk River, Erie Canal, Black River Canal, and New York Central Railway, 100 miles north-west of Albany. It contains a U.S. arsenal, court-house, jail, academy, 17 churches, 2 newspapers, and numerous manufactories. Pop. (1860) of the village, 6246; township about 10,000.

RO'MFORD, a market-town in the county of Essex, stands on the river Bourne, or Rom, 12 miles from London, on the Great Eastern line. The annual horse-fair commences on Midsummer Day, and lasts three days. There are extensive breweries of the famous 'Romford ale.' Agricultural implements are largely manufactured. Pop. (1861) 4361.

ROMILLY, Sir Samuel, English lawyer and law reformer, born March 1, 1757, was descended from a family of French Protestants, who, after the revocation of the Edict of Nantes, emigrated to England. At the age of 16, R. was articled to Mr Lally, one of the sworn clerks in Chancery; and at 21 he entered himself at Gray's Inn. At first he made little progress in his profession; but after a time he began to apply himself to the study of criminal law; and in 1789, entertaining, like many other English Liberals, a sanguine expectation of the happy effects of the French Revolution, he published a short pamphlet on the subject. In 1792, and again in 1795, he declined Lord Lansdowne's offer of a seat for Calne. In 1806, he was, at the instance of Mr Fox, appointed Solicitor-general in the Grenville administration. He unwillingly received the honour of knighthood; but the king having, for the last twenty years, knighted all his Attorneys and Solicitors-General on their appointment, would take no refusal. He was afterwards returned for Queenborough, was one of the managers of Lord Melville's trial, and passed a bill to amend the bankrupt laws. In 1807, he went out of office, and was elected for Horsham, but being unseated, was returned for Wareham. He now devoted himself to ameliorate the severity of the criminal law, and proposed the abolition of the punishment of death in various cases of theft. He also published a pamphlet *On the Criminal Law as it relates to Capital Punishments.* His bills were, session after session, opposed by the government of the day, the judges, and many of the bishops, as dangerous innovations; but R. nevertheless persevered, and lost no opportunity of protesting against the severity and frequency of capital punishments. The measures he proposed for mitigating the severity of the criminal law were, for the most part, carried by others; but he framed an act for rendering the punishment of high treason less barbarous, and another for taking away corruption of blood, as a consequence of attainder of felony. He took an active part in the anti-slavery agitation, and in opposing the suspension of the Habeas Corpus Act, the spy system, and the despotic acts of the government. In 1818, he was spontaneously chosen by the electors of Westminster as their representative. The death of his wife, following upon prolonged mental exertion, preyed upon his mind, and three days afterwards (November 2, 1818) he died by his own hand. He had at this time attained the foremost rank at the Chancery bar, and his professional gains were said to average £14,000 a year. His death excited profound sympathy, and was considered a public calamity. His *Speeches in Parliament* have been published in two vols.; and his Autobiography, with a selection from his Correspondence, admirably edited by his sons, has also been published in 2 vols. —His second son, Sir John Romilly, educated at Trinity College, and called to the bar at Gray's Inn, 1827, was made Solicitor-general in 1848, Attorney-general in 1850, and Master of the Rolls in 1851. In this high office, which he still (1865) deservedly fills, he has incidentally rendered great services to his country by superintending the publication of public records tending to throw much light upon English history and events.

ROMORANTIN, a small town of France, in the dep. of Loir-et-Cher, 25 miles south-east of Blois. At the siege of this town by the Black Prince in 1356, artillery is said to have been first used. Various woollen fabrics are manufactured. Pop. (1862) 7042.


Rompu.

RO'MPU, in Heraldry, a term applied to a cheveron when the upper part is taken off, and remains above it in the field.

RO'MULUS, the mythical founder of the city of Rome. His name is only a lengthened form of Romus, and he is therefore to be regarded rather as a symbolical representation of the Roman people than as an actual individual, like Æolus, Dorus, and Ion, the eponymous ancestors of the Æolians, Dorians, and Ionians. But though the legend of R. cannot be accepted as history in its details or its outlines, it is nevertheless interesting to know how, after the lapse of years, when Rome had become a place of importance, its inhabitants tried to conceive a probable origin for it. We will therefore relate the story of R. as it is usually given. At Alba Longa, in Latium, there had ruled for some centuries a line of kings descended from the Trojan prince, Æneas. One of the latest of these, at his death, left the kingdom to his eldest son, Numitor. Amulius, a younger brother of Numitor, who was ambitious, deprived the latter of the sovereignty, murdered his only son, and compelled his only daughter, Silvia (generally, but incorrectly, called Rhea Silvia), to become a vestal virgin, thereby hoping to secure immunity for his crime. But Silvia having become the mother of twins by the god Mars, his fears were aroused, and he resolved to drown all the three. A cradle containing the babes was thrown into the Anio, whence it was carried into the Tiber. That stream was then in flood, and had overspread its banks far and wide. The cradle was stranded at the foot of the Palatine, and the infants thus wonderfully saved from death by drowning, were no less wonderfully saved from death by hunger. A she-wolf carried them into her den, near at hand, and suckled them, while a woodpecker brought them whatever other food they wanted. This marvellous spectacle was at length beheld by Faustulus, the king's shepherd, who bore the infants home to his wife, Acca Larentia, and had them brought up with his own children. A strife having one day arisen between them and the herdsmen of Numitor, who stalled their cattle on the Aventine, Remus, one of the twins, was taken prisoner, and carried off to Numitor. When the latter looked on the youth, he could not help thinking of his grandsons; and the story of the miraculous preservation of the twins, strengthened the suspicions that were beginning to form in his mind. R. now made his appearance, accompanied by his foster-father; an *éclaircissement* took place; Numitor acknowledged the boys as the sons of his daughter Silvia, and they immediately proceeded to avenge the family wrongs, by slaying Amulius, and placing their grandfather on the throne. But,

continues the legend, R. and his brother did not care to remain in Alba Longa; they loved their old abode on the banks of the Tiber, and resolved to build a city there. The Palatine was chosen (by augury) for the site, and R., yoking a bullock and a heifer to a ploughshare, marked out the *pomœrium*, or boundary, on which he proceeded to build a wall. Remus laughed at the idea of keeping off enemies by such means, and to shew its inefficiency, scornfully leaped over it, whereupon R. slew him, but was immediately struck with remorse, and could obtain no rest till he had appeased the shade of his brother by instituting the *Lemuria*, or festival for the souls of the departed. The next thing which R. did was to erect a 'sanctuary' on the Capitoline for runaway slaves and homicides, and by this means he soon increased the number of his followers; but as wives were much wanted, R. tried to obtain them legally from the neighbouring states. His efforts, however, failed: a 'runaway slave' not being considered a desirable match for his daughter by a Latin or Sabine paterfamilias, and he was compelled to have recourse to stratagem. This led to the celebrated *Rape of the Sabine Women*, the incidents of which are too familiar to require narration. The consequence of this wholesale abduction of virgins was a series of wars, in which, however, R. was invariably victorious, until Titus Tatius, at the head of a large army of Sabines, drove him from the open fields, and forced him to take refuge in his city on the Palatine. R. had also garrisoned the Capitoline, but the treachery of Tarpeia, a daughter of the lieutenant of the fort, placed it in the hands of his adversaries. Next day, a battle took place in the valley between the two hills. It was long and fiercely contested. Sabines and Romans fought till they were exhausted, when the Sabine women rushed in between their husbands and fathers, and implored them to be reconciled. This was agreed to, and henceforth they resolved to unite and to form only one people—the followers of R. dwelling on the Palatine, those of Titus Tatius on the Capitoline and Quirinal. On the death of Titus Tatius, who was murdered at a festival held at Lavinium, R. became sole sovereign, and subsequently—according to a later legend—made successful war against the Etruscan cities of Fidenæ and Veii. The political organisation of the Roman *populus* ascribed to R. is given under ROME. After a reign of 37 years, R. was miraculously removed from earth. While he was standing near the 'Goat's Pool,' in the Campus Martius, reviewing his militia, the sun was eclipsed, and a dark storm swept over the plain and hills. When it had passed, the people looked round for their king, but he was gone. His father, Mars, had carried him up to heaven (like the prophet Elijah) in a chariot of fire. Some time after, he reappeared in a glorified form to Proculus Julius, announced the future glory of the Roman people, and told him that henceforth he would watch over them as their guardian god, under the name of Quirinus. The festival of the Quirinalia (17th February) was instituted in his honour; but the nones of Quintilis (7th July) was the day on which he was believed to have departed from earth.

RO'MULUS AUGUSTULUS. See ODOACER.

RO'NALDSHAY, NORTH AND SOUTH, two of the Orkney Islands (q. v.). *North R.*, situated at the north extremity of the Orkneys, has an area of 4 sq. miles. It is partly under tillage, and partly in pasture. Sea-birds in great variety frequent the coasts, and lobsters and cod are fished. Pop. (1861) 532.—*South R.*, washed on the south by the Pentland Firth, has an area of about 18 sq. miles. St Margaret's Hope, on the north coast, is a safe and convenient harbour. The inhabitants derive their subsistence for the most part from fishing for cod and herrings. Pop. (1861) 2551.

RONCESVALLES, one of the valleys in Navarre, on the southern side of the Pyrenees, about 20 miles north-north-east of Pampluna, has been rendered famous in poem and story as the scene of a defeat sustained by the army of Charlemagne at the hands of a combined force of Arabs, Navarrese, and French Gascons in 778. Charlemagne, allured by the promise of the feudal supremacy of Catalonia, opened a campaign in aid of the viceroy of that province against the Mohammedans. With a powerful army he passed the Pyrenees, penetrated into Navarre, took Pampluna, the capital, and levelled the walls of the city with the ground. Clearly this was not part of his programme as the champion of the Christian religion in Spain; for Pampluna was the capital of a Christian state, and it is even asserted that prior to 870 A.D. Moors had not been admitted within its walls. Pressing onward, Charlemagne subdued a great part of the country between the Pyrenees and the Ebro; but on his return northward, while threading the defiles of the mountains near R., his rear-guard was furiously assailed and annihilated by a mixed force, of which a body of Navarrese, enraged at the destruction of their capital, formed an important section. Eginhard, the secretary of the emperor, tells us that the whole rear-guard, including many generals and chief nobles, was totally destroyed, and that the spoil of the campaign, together with the whole baggage of the army, fell into the hands of the victors. In this action fell Roland (q. v.), the famous Paladin, and the hero of a hundred romances. The older poets found abundant material in the battle of R., in which, on the one side, ranked the most distinguished chivalry of that time, and on the other the patriotic, high-spirited, mountaineers of Navarre; and in recent times the incident has contributed a spirited allusion to Sir Walter Scott's *Marmion*:

> 'Oh, for a blast of that dread horn,
> On Fontarabian echoes borne,
> That to King Charles did come,
> When Roland brave, and Olivier,
> And every paladin and peer,
> On Roncesvalles died!'

RONCIGLIO'NE, a city of Central Italy, in the province of Viterbo, and 12 miles south-south-east of the city of that name. Pop. 5159. It has a fine cathedral, a Gothic castle, and several fine old palaces. Hats, cloth, and cotton goods, are manufactured, and iron, brass, and copper works are in operation. In the neighbourhood of the city there are sepulchral vaults, hollowed out in the porous rock (*tufo*), and several sulphureous springs.

RO'NDA, a picturesque Moorish town of Spain, in the modern province of Malaga, on the Guadiaro, 50 miles north-north-east of Gibraltar. Situated at a considerable elevation, the climate of R. is unusually salubrious, and the town is a favourite summer retreat for the wealthy of Seville, Ecija, and Malaga. The great annual fair takes place in May, at which time R., its bulls and bravoes, are seen to the greatest advantage. On such occasions, the small but active horses of the town are sold in large numbers to officers from Gibraltar; and leather, saddlery, embroidered gaiters, garters, and mantas, are also sold. Pop. 14,100.

RO'NDO (Ital.), or **RONDEAU** (Fr.), originally a little poem of 13 lines, divided into three unequal strophes; the two or three first words of the first line serve as the burden, and recur after the 8th and 13th line. Thence, in music, the term has come

to denote a light air, consisting of three or more strains, the first terminating in the original key, and each of the others so constructed as to conduct the ear back to a repetition of the first strain. In a more general sense, the name rondo is also often applied to any light lively tune which ends with the first strain repeated.

RONGE, JOHANN. See GERMAN CATHOLICS.

RONSARD, PIERRE DE, a celebrated French poet and reformer of French poetry, was born at the Château de la Poisonnière, in Vendômois, September 11, 1524. At the age of nine, he was sent to the Collége de Navarre, but was soon removed, and shortly after entered the service of the Dauphin as page. Handsome, well made, and excelling in all bodily accomplishments, he soon became a general favourite. When his master died (1536), he became attached to the household of the Duc d'Orleans, second son of the king, accompanied James V. of Scotland back to his kingdom, with his new bride, Marie de Lorraine, in 1538; and after a stay of nearly three years at the Scottish, and six months at the English court, he returned to France, and re-entered the service of the duke. A little later, however, on recovering from a serious illness, he found himself afflicted with a deafness, which led him to resign the pursuits of arms for those of letters. With this view, he took up his residence in the Collége de Coqueret, and studied hard for five years. He had previously acquired a knowledge of Latin and of several European languages. His own language, as a vehicle of literary instruction, was a subject of continual meditation with him. Familiar now with the masterpieces of Greece and Rome, he wished (like a true child of the Renaissance, as he was) to invest the national poetry with a classic dignity and grace. Several of his fellow-students shared his opinions and enthusiasm; and in 1549, one of these, Joachim du Bellay, published what may be called the first manifesto of the new school, the *Illustration de la Langue Françoise*. Without denying the necessity or the value of the change thus begun by R. and his friends, we may just remark in passing that the most intelligent French critics now admit that it was too radical, too absolute: it broke abruptly with the national traditions and tendencies, and more than anything else helped to fix that pseudo-classicism of style which was subsequently brought to disastrous perfection in the *splendida vitia* of Corneille and Racine. In 1550, R. himself appeared in the field with his *Amours* and *Quatre Livres d'Odes*. The volume excited the most violent opposition among the adherents of the older national school, and it cannot be said that their antipathy was altogether unreasonable. Rabelais (q. v.) was conspicuous among the adversaries of the new school, and made R. the subject of some bitter sarcasms. But on the whole, the classic party had the best of it. Its efforts were in harmony with the general intellectual tendencies of the time, and, besides, R. was just the man to make powerful friends. Marguerite, sister of Henry II., granted him a pension; the illustrious Chancellor De l'Hôpital warmly encouraged him to persevere in his course; and both Henry II. and François II. covered him with honours and pensions. In 1553, a new edition of the *Amours* was published; in 1555, the first, in 1556, the second, volume of his *Hymnes*; and finally, in 1560, an edition of his whole works up to this period, in four volumes. The admiration of his contemporaries intoxicated him; and he did not shrink from conferring on himself a sort of anticipatory apotheosis. During the religious wars that devastated France, R. made himself noted by the violence of his attacks on the Calvinists or Huguenots. Twenty days after the massacre of St Bartholomew, he published *La Franciade*, an epic fragment. He meant that it should comprise 24 books, but he only finished 4, having, perhaps, discovered that the subject was not happily chosen, and that epic poetry was a touch above him; yet such was the belief in his genius, that not a few of his contemporaries did not hesitate to prefer it to the *Æneid*. Charles IX. could only express his delight by conferring on the lucky bard additional favours. He gave R. the abbeys of Croix-Val and Bellozane, and the priories of Saint-Cosme, of Evailles, &c. But the 'disorders' of what his countrymen call his 'joyous' youth, now began to tell upon him, and, afflicted with premature infirmities, he retired to the abbey of Croix-Val, where he spent most of his remaining years in lettered ease, honoured with the attentions of the great to the last. Queen Elizabeth of England sent him a set of diamonds, and Mary Stewart, from her prison, a set of plate worth 2000 crowns, with the inscription:

A Ronsard, l'Apollon de la Source des Muses.

In 1584, he collected and republished his whole works in one volume, and died on December 27 of the year following. See Saint-Beuve's *Œuvres Choisies de P. Ronsard, avec Notice, Notes et Commentaires* (Paris, 1828).

ROOD, a measure of surface, the fourth part of an acre, and containing 40 square poles or perches. It is quite different from the rood used in estimating mason-work, for which see ROD.

ROOD (Anglo-Sax. *rod*, a cross), a figure of the cross, and generally of the crucifix. The word is also applied to the actual cross on which our Lord suffered, although, when used to signify the relics of the true cross, it is commonly found with the prefix Holy, from which Holyrood at Edinburgh derives its name; but in its most ordinary signification it is applied to the large and striking crucifix which was placed at the entrance of the chancel in most medieval churches. On either side of the cross most commonly were placed figures of the Blessed Virgin and St John, in allusion to John xix. 26. The manner of placing the rood differed in different churches; most commonly it stood upon a gallery or screen at the entrance of the chancel, which was called the ROOD-LOFT or Rood-screen. In England, after the Reformation, the rood of course was, as a rule, removed from all churches; but in a few country churches it still remains in a more or less perfect form. A very perfect foreign example of the rood is in the great church of Louvain.

ROOF. The coverings of houses vary in every climate and every age. In warm countries, such as India, flat roofs, covered with cement, are almost invariably used. The frequent allusions in the Bible to the house-top shew that the roofs of Palestine were flat in ancient times as they are now. Those of Egypt and Assyria (q. v.) were also flat, and were composed of wooden beams, covered with thick layers of earth, forming an impenetrable protection from the fierce heat of the sun. In countries where the climate is milder, and rain more abundant, roofs sloping from a central ridge are the usual form. The Greeks and Romans constructed their roofs in this way. Those of Greece were, in important works, covered with marble slabs, carefully grooved together, so as most effectually to protect the interior from rain. In the common buildings of Greece and Rome, roofing-tiles are used.

In the rainy climate north of the Alps, roofs of a much steeper pitch are employed, so as the more

readily to throw off rain and snow. The angle at the ridge is not uncommonly a right angle, and roofs slated in the usual way should never be less than ¼ of the span (or width between supports) in height. When large slates are used, ¼ of the span in height will suffice.

When roofs are well constructed, they serve to bind the walls together, and thus to strengthen the building. In order to do this effectually, they must not be made of too great weight, otherwise they crush the walls. The actual covering of the roof and its supports are therefore made as light as possible, and the strength concentrated in principals or trusses. The following are the commonest forms of these

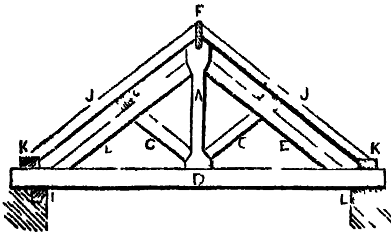


Fig 1

trusses. Fig 1 represents what is called a king post roof (A being the king post), and fig 2 a queen post roof (B, B being the queen posts). The latter is

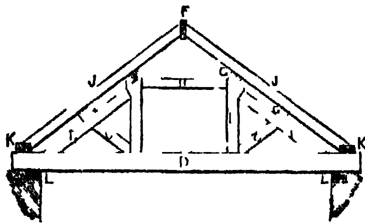


Fig 2.

used for wider spans than the former, and has the advantage of leaving the centre of the roof clear of timbers, so that attic rooms may be introduced. The other members of the truss are named as follows: C, C, C, C, braces or struts; D, D, tie-beams; E, E, E, E, principal rafters; F, F, ridge pieces; G, G, &c., purlins; these and the ridge piece are laid across from truss to truss, and carry the common rafters, J, J. H is a collar; K, K, the pole plates; and L, L the wall plates are laid along at the wall head, to bind the wall and feet of rafters together.

The above system of construction has been in use from a very early time to the present day. The early Christian and probably the Norman basilicas had exactly such roofs. In early Gothic times, roofs of this kind were made ornamental by carving the king post, and moulding the tie-beam. During the Decorated style, an arch, or a series of cants (A, A) was introduced, as shewn in figs 3, 4, and 5. As the style progressed, curved braces were placed

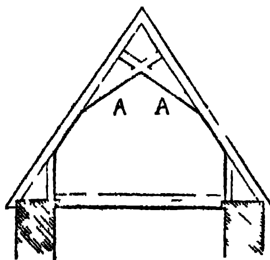


Fig 3.

under the tie-beam, to support it; these were carved, and rested on elegant corbels, the spandrels between the braces and the wall being filled with tracery. In the Perpendicular style, the central part of the tie-beam is cut away, and the beautiful Hammer beam (q. v.) roofs of the period become usual (see fig 6). The roof of Westminster Hall is one of the finest examples of this kind of roof. These open timber roofs are used both in churches and halls, but chiefly in the latter, as the church roofs were frequently vaulted.

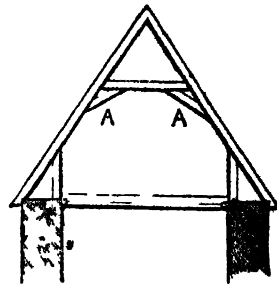


Fig 4.

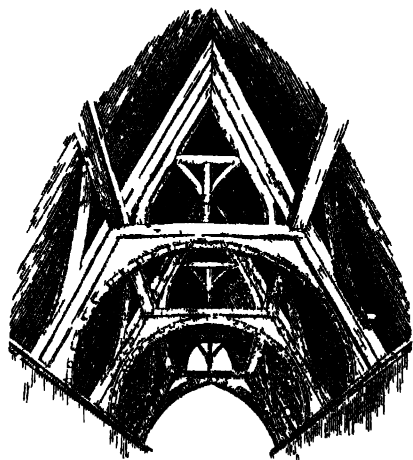


Fig. 5

See VAULTING. In modern times when great spans have to be roofed over, combinations similar to



Fig. 6.

those used in Lattice Bridges (q. v.) are required. Recently, iron has been introduced, and by means

of it, spaces of almost any width can be roofed over.

ROOK (*Corvus frugilegus*), a species of Crow (q. v.), very common in the southern parts of Britain, and found in many parts of Europe and Asia, even to Japan; about the same size with the common or carrion crow, but easily distinguished from it, even at a distance, by its colour, which is a glossy, deep-blue black, in certain aspects grayish. On a nearer view, a more notable distinction is found in the naked warty skin at the base of the bill, extending back rather beyond the eyes, and pretty far down on the throat. Still more different are the habits of the birds, the common crow frequenting lonely situations, and preying much on carrion; the R. choosing rather the neighbourhood of human habitations, and seeking its food, both animal and vegetable, chiefly in cultivated fields. Moreover, whilst the common crow is solitary, the R. is gregarious; and very large companies often assemble in *rookeries*, making their nests in close proximity, generally in tall trees, the same tree often sustaining many nests. So far are they from disliking the companionship of man, that it is not uncommon for rooks to build their nests in the trees which grow in the midst of great cities. A tree even in Cheapside has been occupied by rooks' nests. Few cities or large towns in Britain are without rookeries, sometimes of considerable magnitude. The smoke seems to be disregarded by the birds. The R. is nowhere more abundant than in England and the south of Scotland, but it becomes rare in the northern parts of Scotland, and is not to be seen in Orkney and Shetland; probably, however, not on account of climate, but from want of trees. Sometimes, indeed, rooks have been known to make their nests in steeples, vanes, &c., but rarely. They have been observed to avoid with peculiar caution trees which are decaying and likely soon to be blown over—perhaps, however, on account of the state of their twigs—and trees that are marked on the trunk for cutting down. They are notable for the care with which they guard against the approach of danger, when they are feeding in fields, a few solitary rooks perched on trees, palings, or the like, being ready to give the *caw* of alarm to the often very numerous flock. They are also notable for their dread of a gun, the danger of which they seem to know; so that a man without a gun may approach them much more nearly than a man who carries a gun, and even a stick lifted up is apt to excite their alarm. It is also commonly believed in some districts that they know Sunday, and are less timid of the approach of man on that day than on other days of the week. A gig or carriage may approach them much more nearly than a man on foot, and they are very indifferent about the passage of a railway train. It is interesting also to observe how soon they become familiarly acquainted with scarecrows. The nests of rooks are formed of twigs, lined with grass and fibrous roots; generally containing four or five eggs, of a pale greenish colour, blotched with dark greenish-brown. During the nest-making time, rooks rob each other in a remarkable manner, and prodigious quarrels arise in rookeries on this account. Any pair attempting to found a separate colony on a tree far apart, are apt to be assailed by the whole force of the rookery, and the nest pulled to pieces, its materials of course being carried off.

Rookeries are sometimes of great size, and immense flocks of rooks are often to be seen feeding together in fields, or darkening the sky in their outward or homeward flight. Farmers very often complain of them for rooting up grass and young corn, and for injury to young potatoes, turnips, &c.; but on the other hand, it is urged that they are of very great use by eating up wire-worms, cockchafer grubs, and other insect larvæ, slugs, &c., and that the grass pulled by them is very often that of which larvæ have already devoured the roots. The truth appears to be that rooks in moderate numbers are very useful; but that it is possible to protect them too much, until their multitudes become a nuisance in a neighbourhood, the insufficient quantity of their favourite food compelling them to other resources not so agreeable to the farmer; and at least in such circumstances they certainly devour large quantities of grain.

It has been supposed that the naked space at the base of the bill of the R. is in consequence of its habit of digging in the ground, and in support of this view it is urged that this space is feathered in the young bird, but it is found to become naked even in rooks caged from the beginning of their life, and there are numerous other arguments against the supposition. The naked space must be regarded as a natural peculiarity of the species.

The same rooks seem to take possession of their old nests year after year, repairing them, and not building new ones. The time of building and repairing nests is one of prodigious clamour in the rookery, and begins early in spring. The male R. feeds the female assiduously during incubation, and sometimes takes her place on the nest. Both parents bring food to their young ones.

The R. is capable of being tamed, and tame rooks have been known to exhibit something of the imitative power of voice possessed by several other birds of the same family.

White, cream coloured, and pied rooks are now and then seen. These peculiarities of plumage probably arise from a more or less diseased condition.

ROOKERIES, in LAW. Though rooks are often encouraged to breed in and to frequent the trees of an estate, yet they are not protected in any way by laws resembling the Game Laws, which inflict penalties for illegally trespassing to take or kill them. The rooks, while frequenting the rookery, whether it is an ancient or a newly made rookery, are in the ordinary category of wild animals, and the owner of the estate or ground where the trees grow has no more property in them than any other person. The owner of a rookery once brought an action against a neighbour for shooting at the rooks as they were flying over the neighbour's estate towards the rookery; but the English courts held that no such action was maintainable, for every person may shoot and catch a wild animal upon his own lands, if he pleases. The law is the same in Ireland and Scotland. No person can be given into custody, or fined, or punished by justices of the peace for trespassing in order to shoot at rooks; nevertheless, the owner or occupier of the ground trespassed upon may bring an action of damages against the trespasser.

ROOKE, SIR GEORGE, a distinguished British admiral, was born in the year 1650, near Canterbury, at the country-seat of his father, Sir William Rooke. Having entered the navy, he found himself, at the age of 30, a post-captain; and in 1689, he was promoted to the rank of rear-admiral. He was engaged in the action off Beachy Head between the Earl of Torrington and the French admiral De Tourville; and in 1692, he took part in the memorable battle of La Hogue, fought between the French fleet and the combined English and Dutch force under Admiral Russell. On this occasion, his services were of the most brilliant and dashing character, and in acknowledgment of them, he received the rank of vice-admiral of the red, the honour of knighthood, and a pension of £1000 a year.

His next important service was the destruction of a Spanish plate-fleet in the port of Vigo; and in July 1704, in conjunction with Sir Cloudesley Shovel, he accomplished the capture of Gibraltar. Such was the vigour of the operations, that a single week sufficed for the reduction of a fortress, which, as having defied the most formidable, elaborate, and prolonged attack, has since been reputed impregnable. On the 9th August of the same year, he engaged off Malaga a French fleet of much superior force, under the Comte de Toulouse, and fought one of the bloodiest of our naval battles, the honours of which fairly remained with the English, though the escape of the enemy's force rendered it by comparison a barren triumph. The struggle lasted through nearly a whole day; the French loss was upwards of 3000, the English upwards of 2000 men. On the return of Sir George to England, he was received with marked distinction by Queen Anne; but finding the hostility of the government directed against him on the merely partisan ground of his having previously, as member for Portsmouth, allied himself with the opposition, he resigned his employments, and along with them his seat in parliament; and till his death, which took place on the 24th January 1709, led the life of a quiet country gentleman on the family property in Kent. He was thrice married, and left behind him one son by his second wife.

ROOT, in Botany, sometimes designated the *descending axis* of a plant, that part by which it is fixed to the soil and derives nourishment from the soil. The root is developed in the germination of the seed, at or about the same time with the stem, and forces its way downwards as the stem grows upwards. The root differs from the stem in the irregularity of its ramifications, in the want of a central pith, in the want of buds, in the want of scales or of scars to indicate their former presence, and in the want of stomata. The axis of the root giving off branches, these finally subdivide into *fibrils*, which are little bundles of annular ducts, or sometimes of spiral vessels encased in woody fibre, and covered with a lax cellular integument. The apex of each fibril is sometimes called the *spongiole*: it consists of extremely lax cellular tissue, and has the property of absorbing fluids with great rapidity, thus subserving the nourishment of the plant. See ENDOSMOSE.—Aerial roots occur in some plants, as in some *Epiphytes*, the Banyan, Mangroves, &c.; by which nourishment is derived from the air, in addition to that obtained through the leaves and bark, or by which the branches seek to connect themselves anew with the ground, for support and nourishment; and many plants, as Willows, produce adventitious roots very readily, when any portion of the stem or branch is imbedded in moist soil, of which advantage is taken for their artificial propagation. The central axis of many roots goes deep into the ground in a tapering manner, forming what is called a *tap-root;* other roots have the descending axis very short, and are called *fibrous*. The roots of some plants spread very widely; those of others occupy a very limited space. The roots of coniferous trees and palms are very small when compared with the appearance of the tree above ground.—Tap roots sometimes assume a conical form, as in the carrot; others are variously developed in thickness at the upper part, as in the turnip and radish. TUBERS (q. v.), BULBS (q. v.) and CORMS (q. v.) are peculiar developments, evidently intended to secure a store of nourishment for the plant, but which also are very frequently available for the use of man.—Esculent roots are numerous, and many roots also contain secretions either peculiar to themselves, or more abundant than in the other parts of the plant, and become therefore useful in medicine or in the arts, while some are very poisonous. The roots used for food, besides the tubers, bulbs, and corms above mentioned, are generally those which are thick and fleshy. The plants to which they belong are of very different genera and orders—some of the natural order *Cruciferæ*, as the Turnip and others of the genus *Brassica*—some of the order *Chenopodiaceæ*, as Beet and Mangold Wurzel—some of the order *Umbelliferæ*, as the Carrot, Parsnip, &c.—some of the order *Leguminosæ*, as the *Pachyrhizos angulatus*, which is cultivated in all parts of the East Indies, and *P. trilobus*, which is cultivated in Cochin China. In many of the lower classes of plants, particularly the Algæ, there is no root whatever, although the plant is often attached by a base.

ROOT, in Philology, is that part which is common to a group of allied words—the germ out of which they have all sprung. It is arrived at by taking away the formative parts—the suffixes and affixes, and reversing any change that their presence may have caused. Thus, in co in-*cid*-ence, the root-syllable is *cid*, the primary form of which in Lat. is *cad*, to fall. It is seldom that this analysis can be successfully performed with only one language; in order to get at the true root, the corresponding words in all the languages of the same family must be compared. Thus, in the Eng. words *story, history, historical, historically, histor* would seem to be the root; but by comparing the Greek with the Lat. and Sanscrit, we arrive at a syllable *vid*, meaning to see or know, of which the Eng. (to) *wit* (wist) is only another form. And even then we are not sure that we have arrived at the original and most simple form. Thus, Eng. *yoke*, Lat. *jugum*, come from the syllable *jug*, to join, seen in Lat. *ju(n)go*, Gr. *zeugo;* and this might be rested in as the root, were there not a simpler form, *ju*, preserved in Sans., and having the meaning of mingling or being together; this, which may be taken as the primary root, gives rise to the two secondary roots or modifications, *jug*, to join, and *yudh*, to fight (i. e., to join battle).

The roots of the Aryan languages are always monosyllabic, as *i*, to go; *ya*, to go; *ad*, to eat; *vak*, to speak; *star*, to strew. They are divisible into two classes, the one expressing some action or general property, as in the instances now given; the other indicating relative position, as *ma*, here or me; *ta*, there or that. The one class are called *predicative* roots; the other, *pronominal* (see PRONOUN, PREPOSITION). They all expressed primarily some physical notion or relation palpable to the senses; but from these the transition to the impalpable conceptions of the mind is natural and obvious; thus, *vid*, to see, served also for to know. The notion expressed by a root-word is always of a very general kind; but by a variety of expedients, such as lengthening the vowel, reduplication of the syllable, prefixing and affixing letters and syllables (many of which at least are evidently pronominal roots), and composition with other predicative roots, one germ gives rise to a whole group of words expressive of the specific applications of the generic idea. Thus, from the root *spac* or *spec* (in Gr. *skep*), to look, have sprung a numerous family of words in the English and other kindred tongues; *spy, despise* (to look down upon), *spite* (through Fr. *despit*), *respite, respectable, suspicion, prospect, inspect, auspices, speculum, species* (i. e., the appearance or individual form, as opposed to the kind or genus), *spices*, &c.

Roots, in the Aryan languages, never enter into speech in their pure and simple form; to make them words, they almost always take on the addition of a pronominal element. Thus, the reduplicate root *da-da*, having the sense of giving, becomes, by the

addition of *mi*, my. the word *da-dâ-mi*, I give; *vak*, to speak, by affixing *s* (for *sa*, that), becomes *vaks*, in Lat. *vox* (*voks*), voice (i. e., that speaking). See INFLECTION.

It requires but a few germs to produce, by the processes above described, the most copious vocabulary. The 50,000 words of the Chinese dictionary are formed from 450 roots; those of Hebrew and of Sanscrit are reckoned at about 500; and there are probably not many more in English (see Max Müller's *Lectures*, 1st series, p. 252). The theories as to the origin of the roots themselves, and why a particular thing or notion should have become associated with a particular sound more than with any other, are noticed under PHILOLOGY and ONOMATOPŒIA.

ROOT, in Algebra, denotes any value of the unknown quantity in an equation, which will render both sides of it identical. See EQUATION, INDETERMINATE PROBLEMS, IRREDUCIBLE CASE, &c. The determination of the roots of equations, either formally or actually, constitutes the greater portion of the science of Algebra, while the approximation to roots of those equations whose degree is still beyond a general solution (4th and upwards) forms almost a separate branch of itself. Roots are divided into various classes; they are *real* when they consist of numerical quantities positive or negative; and *imaginary* when they assume the form $a + b\sqrt{-1}$.

ROOT-MILDEW, a name given, not to any well-determined species of fungus, but to certain *mycelia*, which infest the roots of peaches, apples, roses, currants, &c., and cause their death. The tree or shrub is often very suddenly cut down, from apparently perfect health. The roots are found more or less decayed, and covered with filmy white threads. The *mycelium* is supposed to belong to species of *Polyporus*. In some plants, as roses, the state of the bark just above the soil is believed to be premonitory of the disease, which may perhaps then be arrested by washing with a solution of corrosive sublimate. But the mycelium is not easily destroyed, and a tree of the same kind should not be planted where it has proved fatal.

ROOT-PARASITES, plants which grow upon, and derive their nourishment from, the roots of other plants. Such are the Broom-rapes (*Orobanche*, q. v.), species of *Thesium*, &c., and the *Rafflesias* (q. v.), with other *Rhizantheæ* (q. v.).

ROOT-STOCK, or RHIZOME (*Rhizoma*), in Botany, a stem running along the surface of the ground, partially covered with soil; sending out roots from its lower side, and leaf-buds from its upper. The common yellow iris affords a very perfect example of it. Many ferns have root-stocks. The root-stock is often regarded as a creeping root; it is really, however, not a root, but a stem.

ROPE AND ROPE-MAKING. Ropes are usually made of vegetable fibres, and differ only from twine in their much greater thickness. The fibre most commonly used in Britain is hemp; but large quantities of plantain fibre, called Manilla hemp, made from the leaf-stalks of *Musa textilis*, are also employed, especially for the large ropes used for various purposes on board ships. In other countries, many other fibres, and even cotton, are employed for this purpose. Ropes consist of many thicknesses of yarn, which is spun by hand in places called rope-walks. The spinner has a large bundle of the fibre loosely gathered round his waist, from which he pulls out a few fibres, and attaches them to a hook in the turning wheel or whirl, which is stationary, and is worked by an assistant. Experience teaches him what number of fibres to draw out, and how to twist them so as to hold firmly on to the hook. He then walks slowly backward down the rope-ground, gradually drawing out or regulating the pulling out of the fibres so as to make an equal yarn, which receives the necessary twist from the whirl. When he has got to the end of the walk, another spinner takes the yarn from the hook of the whirl, and fixes it to a reel, which is then set in motion; and he attaches a second portion of hemp from his own supply to the hook, and proceeds down the walk as the previous one had done. In the meantime, the first spinner gradually walks up the ground, carefully guiding his length of yarn as it is wound on the reel. When he reaches the reel, it stops, and he waits until the second spinner's length is completed. He then in his turn takes it off the hook, and twists it on to his own; and the reel being again started, receives the additional length from the second man, and so on until the full length required is made up. The next operation is called *warping*, and consists in stretching out the number of yarns required for a rope. These are all slightly twisted again separately, and stretched to an equal length. Then, if they are intended for tarred ropes, such as is used in rigging ships, each yarn is drawn separately, either lengthwise or in a hank, through a kettle of hot tar. The superfluous tar is removed by drawing it afterwards through a handful of loose oakum, or through a hole lined with oakum. In the next process, called *laying*, two or more yarns are attached to hooks on a whirl, so that when it is turned they will be twisted together the contrary way of the original twist they received in the first spinning. When this is done, it is called a strand. Then as many of these strands as are required for the rope are stretched at full length, and are attached at each end to whirls. One of the whirls has but one hook, to which all the strands are attached; the other has as many hooks as there are strands, one always being central, and a strand is attached to each. The whirls are then put in motion, but in opposite directions, and this causes the outer strands to be laid with great regularity and firmness around the central one. Such is the ordinary process of rope-making; but modern science has been brought to bear upon this as upon every other branch of industry with extraordinary effect; and machines have been invented which produce ropes with such mathematical precision that the strength of the rope may be calculated with great exactness. Captain Huddart has the merit of effecting these improvements; and very few applications of mechanism are more beautiful in their details than those which he has worked out. They, however, do not alter the principle of the manufacture, and their elaborate details are not within the scope of this work.

Large ropes are either what is called *cable-laid* or *hawser-laid*. The former consist of three large strands, each made up of three smaller strands. A cable-laid rope of eight inches' circumference is made up in this way of nine strands, each containing thirty-seven original yarns, or altogether 333 yarns. A hawser-laid rope consists of only three strands, each containing a sufficient number of yarns to make up the required thickness. The numerous lives and the vast property depending on the efficiency of ropes employed in shipping have caused a great amount of ingenuity and care to be brought to bear on the manufacture. One very great improvement of modern times has been the introduction of wire-ropes, which are now extensively used in rigging ships, and for other purposes. They are generally made of iron wire, sometimes but not always galvanised. The twisting is effected

in the same way as that in wl ch the strands of a hempen rope are laid together.

ROQUE, St, a popular saint of the Roman Catholic Church in France, who is especially con sidered the p tion of those sick of the plague Of his history, n vertheless, few particulars have been preserved He w as born of a noble family in Mont pelier, early in the 14th, or at the end of the 13th c , and having undertaken a pilgrimage to Rome, was surprised, upon his way through Italy by in outbreak of the plague at Piacenza where he devoted himself with generous z al to the care of the victims of this pestilence Falling sick of the plague himself, and abandoned by man, he con trived to drag himself to a neighbouring wood, where a dog used to lick his sores, and it pl ased God to restore him to health He returned to France and after a life of great sanctity, died at Montpelier, probably in 1327

RO'REE, RORI, or LOHRI, a decayed town of Sinde, stands on a picturesque rocky eminence, on the east bank of the Indus in lat. 27° 35' N Steamers ply to and from Hyderabad Cotton and silk fabrics, gold and silver wares, paper, and leather, are manufactured Pop about 8000

RO'RQUAL (*Rorqualus, Balænoptera,* or *Physalus*), a genus of Cetacea of the same family (*Balænidæ*) to which the Greenland whale belongs, and distinguished by having a dorsal fin which however, is not large in comparison with the size of the animal, and is pointed, the point directed backward, and also by the form of the head which, instead of having the upper jaw much arched as in the Greenland whale, has it in the latter nearly straight, the plates of baleen or whalebone being therefore much shorter whilst along the throat and belly are many longitudinal folds allowing of the distention of the integuments so as to form a great pouch for the reception of water and prey, to be afterwards sifted by the plates of baleen For a long time these folds of the throat and belly were a puzzle to naturalists, but their use seems now to be thoroughly ascertained The form is more elongated than in the Greenland whale, and as the girth of the largest rorquals has been found equal to that of the largest Greenland whales, the rorquals appear to be the largest of the Cetacea and indeed of all animals at present existing in the



Northern Rorqual

world. The northern R sometimes rather exceeds 100 feet in length Concerning the species of this genus, there is great doubt and uncertainty Some naturalists confidently assert the existence of several species in the northern seas, and a genus *Rorqualus* or *Physalus*, has been constituted distinct from *Balænoptera*, the largest species being referred to the former, and a smaller one, said not to exceed 25 feet in length, and known as the *Pike Whale,* from the resemblance of the mouth to that of a pike, being assigned to the latter Other naturalists of no mean reputation doubt if the Pike Whale (*Balænoptera rostrata,* or *B musculus*) is anything else than the young of the Great Northern R, (*R. Boops*) the *Finfish* or *Razor back* of whalers. The question was supposed to have been determined by Mr F Knox of Edinburgh who found the number of vertebræ to be different in specimens cast upon the Scottish shore but the number of vertebræ has been found so different in other specimens examined that either this must be a comparatively unimportant character, or the number of species must be greater than has been supposed The northern R is of a slate gray colour whitish beneath It is found in the arctic seas visiting also those of the north in temperate regions and is not very unfrequent on the coasts of Britain When it comes to the surface of the water to blow, it does not lie motionless, as the Greenland whale usually does, but swims at the rate of about five miles an hour, and in blowing, it makes a prodigious noise Its speed, when harpooned is very great Scoresby mentions an instance of one carrying out 3000 feet of line in a minute It is not easily captured and whalers dislike it, because the Greenland whale is seldom found near it, whilst its own value is very inferior, owing to the comparative thinness of the blubber and the shortness and inferior quality of the whalebone It is however, an important object of pursuit to the Laplanders and Greenlanders who wound it and by assailing it with weapons it is weakened and finally divide the spoil A large R yields 2000 gallons of oil The R does not feed so exclusively on small prey—pteropods mollusks, &c.—as the Greenland whale Its gullet is much wider and it preys much on fishes the shoals of which it follows into bays and estuaries sometimes in multitudes The stomach of a R has been found to contain 600 large cod and a great quantity of pilchards One which frequented the Firth of Forth for 20 years was well known to the fishermen there, and much detested by them It was at last stranded at Alloa in 1692 It was 78 feet long—In the southern seas another species of R is found (*R, B,* or *P Australis*) which has a long dorsal fin placed farther forward than in the northern rorqual It attains a large size The Southern whalers do not care to pursue it Its range seems to extend to the north in the hemisphere in the Pacific

ROSA, SALVATOR, was born at Renella, in the neighbourhood of Naples in 1615 His first instructor was Francesco Fracanzano, who had married his sister Some of his landscapes attracted the notice of Lanfranco who purchasing them, applauded and encouraged the young artist to pursue his studies He became a pupil of Aniello Falcone a painter of battle pieces and afterwards of Spagnoletto Having gone to Rome he was employed to paint an altar piece and some other works by the Neapolitan cardinal Brancaccio, and he accompanied Prince Carlo de Medici to Florence and executed several important works for him He finally settled in Rome in 1638, and died there, March 15, 1673 Salvator has a great reputation as a painter and he owes this mainly to his landscapes, which though faulty in many respects, arrest attention by originality in subject and treatment, being generally representations of wild and savage scenes executed with a freedom and decision remarkably appropriate Salvator executed numerous etchings, highly characteristic of his peculiar style.

ROSACEA, known also as GUTTA ROSEA and ACNE ROSACEA, is a disease which usually first appears at or near the end of the nose, and in some cases it is confined to the nose, while in others it extends to the cheeks, forehead, chin, or even to the whole face. The skin in the part affected assumes a deep red colour, which usually disappears after a time, but returns either on no special provocation or in consequence, apparently, of some gastric disturbance and after a time becomes permanent, pustules of acne—a chronic pustular disease of the skin—now appear, and their yellowness contrasts strongly with the redness with which they are surrounded. The skin of the diseased part becomes irregularly swollen and is marked with blue or red streaks caused by congestion and enlargement of the capillaries; the whole surface, in a severe case, presenting a very disagreeable and repulsive appearance. This affection is no doubt often a result of intemperate living, but it may occur in persons of regular habits of life. Disorder of the digestive system is so often associated with it as to excite the idea that the combination is accidental and the skin disease may often with great probability be referred to gastric disturbance as the exciting cause. The disease is confined almost exclusively to persons in middle or advanced life, and women are especially liable to it about the period in which what is popularly known as the 'change of life' occurs; moreover, it has occasionally been observed to hereditary. The general treatment consists in the administration of the compounds of iodine and mercury (singly or conjoined) in alterative doses, and Donovan's Solution has been especially recommended, and a nourishing but bland and unstimulating diet should be prescribed. In the early stages of the disease, the local treatment should be soothing. Emollient lotions, such as emulsion of bitter almonds, cream, glycerine, &c., may be occasionally used during the day, and in severer cases a bread poultice may be applied to the face at night. When the affection becomes indolent, these emollients should be gradually replaced by stimulating applications, such as Eau de Cologne, or a solution of corrosive sublimate in alcohol, in the proportion of from 1 to 2 grains in the pint, and at a still later time iodide of sulphur ointment in the proportion of 15 grains or a scruple of the iodide to an ounce of lard is well deserving of a trial. When the disease is of long standing it sometimes defies all known remedies.

ROSACEÆ, a natural order of exogenous plants containing many species of great usefulness, and many that are in the highest esteem for their beauty. It contains trees, shrubs, and herbaceous plants, natives chiefly of cold and temperate regions and far more abundant in the northern than in the southern hemisphere. Within the tropics, they are chiefly but not exclusively found in elevated situations. The leaves are alternate, have stipules, and are either simple or compound. The flowers are generally hermaphrodite, but sometimes unisexual; the inflorescence various. The calyx is 4—5 lobed, generally 5 lobed, the petals as many as the divisions of the calyx, or occasionally wanting, perigynous. The stamens are few or many, arising from the throat of the calyx; the ovary sometimes solitary, sometimes there are several ovaries, each one-celled, with a lateral style, or a number of ovaries are united into a many-celled pistil; the ovules generally two or more. The fruit is sometimes a drupe, sometimes a pome, sometimes follicular, sometimes an achœnium, sometimes a heap of achœnia, or of one-seeded berries, sometimes a heap of achœnia, covered with the fleshy tube of the calyx.—This natural order contains at least 1000 known species, but in some of the genera, as *Rosa* and *Rubus*, the determination of the species is attended with great difficulty, and varieties—sometimes reckoned species—are numerous.—The order, as generally received, is divided into a number of sub-orders, several of which have by some botanists been elevated to the rank of distinct orders, as *Amygdaleæ*, *Pomaceæ*, *Sanguisorbeæ*. See also ROSE, RUBUS, STRAWBERRY, POTENTILLA, TORMENTIL, AGRIMONY, GEUM, KERRIA, SPIRÆA, CUSSO, &c.

ROSARY OF THE BLESSED VIRGIN MARY (Lat. *rosarium*, a chaplet of roses), the name given to a very popular form of prayer in the Roman Catholic Church. The name rosary has been variously traced either to the title 'Mystical Rose,' one of the titles under which the Blessed Virgin is addressed in the litany of Loretto (q. v.), or to St Rosalia's wreath of roses well known in sacred art, or to the beads being originally made commonly of rosewood. The origin of the devotion it is popularly traced to St Dominic (q. v.); but it is quite certain that its characteristic feature, the use of beads as a means of reckoning the number of repetitions of a certain prayer, is of far greater antiquity. See BEADS. Palladius tells of the Abbot Paul, whose daily practice it was to repeat the Paternoster 300 times, that he used a number of small pebbles to secure a correct enumeration, dropping one of these into his lap at each repetition. Later, a string of beads worn round the neck, and called *Bellidum*, was substituted. As the same use of beads exists among the Mohammedans, some writers have traced the Roman Catholic practice to a Mohammedan origin; but it appears quite certain that the practice existed among Christians before the time of Mohammed. Originally the prayer so repeated was the Lord's Prayer; but when in the 11th and 12th centuries the so-called angelical salutation, 'Hail, Mary,' &c., became a frequent form of prayer, it was added to the 'Our Father;' and it seems beyond all doubt that the rosary in its present form was, if not devised, at least fully introduced and propagated by St Dominick. The rosary, although called of the Blessed Virgin Mary, is a series of fifteen prayers founded on the chief mysteries of the incarnation and passion of our Lord, interspersed with repetitions of the 'Our Father,' the 'Hail, Mary!' and the doxology. It consists of three parts, each of which contains five so-called mysteries, connected with our Lord's incarnation and public mission on earth, his passion and death, his resurrection and ascension, and the assumption of the Blessed Virgin Mary. Each of these parts thus contains five mysteries (called also 'decades' from the ten 'Hail, Maries') consisting of (1) a 'meditation,' briefly proposing the mystery which is to be meditated upon, (2), one 'Our Father,' (3), two 'Hail, Maries,' (4), one doxology, (5), a prayer begging for the special grace or fruit appropriate to the particular mystery. The whole rosary, therefore, consists of 15 mysteries or decades, and thus comprises 15 'Our Fathers' and 'Doxologies,' and 150 'Hail, Maries.' The devotion of the rosary takes several forms. The 'Greater Rosary' consists of the recitation of the whole fifteen mysteries or decades, with their component prayers. The 'Lesser Rosary' consists of one of the three parts, or of five mysteries or decades. The 'Living Rosary' is recited by an association of fifteen individuals, each of whom engages to say daily one mystery. When recited publicly, the prayers are repeated alternately by the priest or other person presiding at prayer, and by the congregation. There is a

form of the rosary common in foreign countries, especially Germany, in which the substance of each 'mystery' is condensed into a short prayer of three or four words, which are appended to the 'Hail, Mary!' and thus serve perpetually to recall the subject to the mind of the person praying vocally. The rosary has been sanctioned and recommended by numberless popes and other ecclesiastical authorities, and Indulgences (q. v.) have been granted to persons reciting it with proper dispositions. It is regarded by Roman Catholics as one of their most excellent forms of prayer, and as placing the devotion to the Blessed Virgin Mary on its true footing—that of a devotion to the incarnation and death of her Son, Jesus Christ. It is expressly recommended for the poor and the ignorant; and there are instructions specially designed for these classes, in order to enable them to combine prayer of the mind with prayer of the lips.

The mechanical instrument, so to speak, of this devotion is also called by the name rosary. It consists of a string of beads, equal in number to the 'Our Fathers' and 'Hail, Maries' which are recited in the rosary—the 'Our Father' beads being of a larger size—one of which is passed through the fingers at each recitation of the prayer, and thus secures the person praying from errors of memory. The beads are of various material—berries, wood, stone, ivory, metal, &c., and are often of costly workmanship, and of considerable intrinsic value. They are blessed for the use of the people by the pope, by bishops and superiors of religious orders, and by others having special power for the purpose.

ROSAS, Don Juan Manuel, ex-president of the Argentine Confederation, born at Buenos Ayres in 1793, is descended from an ancient family of the Asturias. He entered the army of Buenos Ayres, and in 1829 rose to be governor or captain-general of his native province, then in federal union with Entre Rios, Corrientes, and Santa Fé. He shewed great courage and capacity in subduing the disaffected Indians, and internal peace being thus secured, he turned his attention to the state of the confederation, which, in 1835, was falling to pieces by the feebleness of its governments. A single president was, upon his recommendation, elected for the whole Argentine Confederation, and the choice fell upon Rosas. His residence was to be Buenos Ayres, and to this state were intrusted the external relations of the Confederation, and the management of the more important functions of the executive. Intestine commotion subsided under his rule, the industrial resources of the country were developed, and foreign commerce rapidly increased. The other states, however, became jealous of the growth and power of Buenos Ayres, and R. was accused of a design to extend and uphold the undue predominance of his state, and to give his native city a monopoly of the trade of the River Plate. In the execution of this design, he sought to compel Paraguay to join the Confederation. This involved R. in a war with Brazil, in which his troops were outnumbered, yet he obstinately kept up the struggle for five years. An attack on Monte Video was also rendered necessary by his policy; but England and France interfering for the protection of that city, R. was again defeated; yet he managed to resist the allied forces from 1845 to 1850. His rule had by this time become so oppressive and intolerable, that the subject states revolted, and selected Don J. J. Urquiza as their president and general. A battle ensued at Monte-Caseros, 3d February 1852, when R.'s forces were put to flight. Urquiza entered Buenos Ayres as president of the Confederation; and R., who was compelled to flee, obtained a refuge in England, in which country he has for the most part resided since the year 1852.

RO'SCIUS, Quintus, was born at Solonium, a village near Lanuvium, and rose to be the greatest comic actor in Rome. So much was he admired, that many of the Roman aristocracy befriended him, and the dictator Sulla, as a token of favour, presented him with a gold ring, the symbol of the equestrian order. Among his most admiring and affectionate patrons, R. also numbered Cicero, who, at the commencement of his career, received lessons in the art of elocution from the great comedian, and even in later life used to make trials of skill with his instructor as to which of them rendered a thought most clearly and effectively—the orator by his diction, or the comedian by his gesticulation. So sensible was R. of the distinction he enjoyed in sharing the intimacy, and even the friendly emulation of the great orator, that he came to look upon his art as one of no small importance and dignity, and wrote a treatise on the comparative methods and merits of eloquence and acting. Cicero's friendship was of use to him in another way, for on his being sued at law by C. Fannius Chaerea for the sum of 50,000 sesterces, Cicero defended him before the judex Piso (probably 68 B.C.) in his extant oration, *Pro Q. Roscio Comœdo*. He died 62 B.C., having attained such perfection in his peculiar art, that to be a 'Roscius' became synonymous with pre-eminence in every profession, and leaving, like his famous contemporary, Æsopus the tragedian, an immense fortune, realised upon the stage.

ROSCOE, William, the eminent historian of Lorenzo de' Medici and Leo X., was born near Liverpool on the 8th of March 1753. His father was a market-gardener, whose assistant in this business he became in his twelfth year, after receiving the rudiments of learning at a common school. In this occupation he continued for about three years, during which his fondness for reading developed itself; and in 1769, after making trial for a year of a bookseller's shop, he was articled to an attorney at Liverpool, where, in 1774, being admitted an attorney of the Court of King's Bench, he began to practise on his own account. During all this period, he assiduously cultivated his mental powers, turning his attention to the classics, and especially to the Italian language and literature. In 1773, he first appeared in print as the author of a poem; and in 1777, a collection of some of his earlier pieces was published, containing his first protest against the slave-trade, of which, throughout his life, he was a strenuous opponent. In 1796 was published the first volume of his *Life of Lorenzo de' Medici, called the Magnificent*, which had been begun many years before, and in the composition of which he was greatly aided by the collection for him of valuable materials in Italy, from sources in print and manuscript, by his friend Mr Clarke. The success of this work was extraordinary, and it at once established his literary reputation. The work was received with the highest approbation by those who were best able to appreciate its merits, both in England and on the continent, especially in Italy; it went through several editions, and was translated into German, French, and Italian. In 1805, appeared his second great work, the *Life and Pontificate of Leo X.*, for which, with the assistance of others, he had been collecting materials for many years. This work also, which, like the former, appeared successively in German, French, and Italian, was received with much commendation by the most impartial judges, though its tone and

spirit, especially with reference to the Reformation, were severely criticised by others.

R. at one time had thoughts of adopting the bar as a profession; but about the year 1800, he became partner in a Liverpool bank, a step which involved him eventually in great pecuniary embarrassment. In 1806, he was returned to parliament for Liverpool in the Whig interest, and had the gratification of taking part in the abolition of the slave-trade, but did not again come forward after the dissolution in 1807. He was, throughout, a consistent opponent of the war with France, against which he published several pamphlets, and was on all points the advocate of liberal opinions. He took an active part in founding the Liverpool Royal Institution, and was a zealous promoter of literature, and patron of the fine arts. R. died at Liverpool, June 30, 1831. During the latter years of his life, he devoted himself much to the study of botany, and in honour of him, a rare genus of Monandrian plants received in 1826 the name *Roscoea*.

ROSCOMMON, an inland county of Ireland, in the east of the province of Connaught, and bounded on the east by the river Shannon, is 60 miles long from north to south, by 40 miles from east to west. Area, 607,691 acres, of which 440,522 are arable, and 142,900 were under crop in 1862. The population, in 1861, was 173,436, of whom 150,490 were Catholics, 5227 were Protestants of the Established Church, and the rest Protestants of other denominations. The surface of R., which belongs to the central plains of Ireland, is level, with undulations rising in the south into the Slieve Bawn range, the highest point of which is 867 feet in height; and on the north, into the Curlew Mountains, of which Slieve Curkagh attains a height of 1098 feet. Its principal rivers are the Shannon (q. v.) and the Suck. R. communicates by means of the Midland Great Western, the Southern and Western, and North-western railways, with all the extremities of the kingdom. In geological structure, it belongs to the central limestone formation, in some districts of which the sandstone protrudes. The soil in the central district is in general light, but fertile, and affords the finest sheep-pasture in Ireland — the celebrated 'Plain of Boyle.' Some portions also contain a rich and fertile loam, which produces good cereal crops; but the chief industry of the R. farming population is the feeding of sheep and cattle, especially the former.—The county can hardly be said to possess any manufacture worthy of mention. The chief towns are Roscommon (q. v.), Boyle, Castlerea, Elphin, Strokestown. Ballinasloe and Athlone lie upon the border, and are partly within this county. R., in the ante-English period, was the country of the septs of MacDermot, O'Daly, O'Kelly, and above all, O'Conor, of which there were two branches, that of the O Conor Roe (red), and that of O'Conor Don or Dhun (brown). The present representative of the O'Conors, the O'Conor Don, is one of the very few Irish princes who have succeeded to the hereditary estates of their ancestors.

R. sends two members to the imperial parliament. It possesses a vast number of antiquities of the Celtic period, raths, &c.; a portion of a round tower at Oran, several remains of strong castles of the English period, and some fine ecclesiastical ruins, of which Boyle, Roscommon, Tulsk, and Clonshanville are the principal.

ROSCOMMON, the capital and assize town of the county of the same name, Ireland, in the middle of the county, 96 miles west-by-north from Dublin. The population, in 1861, was 2699, of whom 2406 were Catholics, 255 Protestants of the Established Church, and the rest Protestants of other denominations. R. dates from the 13th c., when it arose around a Dominican abbey, founded by the O'Conor in 1257, and a castle built soon after by Sir Robert de Ufford, the remains of both of which structures still exist. R. is a market-town, in which corn is the principal commodity. It has scarcely any manufacture, and little commercial enterprise of any kind. It returned two members to the Irish parliament, but was disfranchised at the Union.

ROSCREA', a market-town of the county of Tipperary, Ireland, 91 miles south-west-by-west from Dublin, with which it is connected by a branch from the Great Southern and Western Railway. The population, in 1861, was 3543, of whom 2907 were Catholics, 243 Protestants of the Established Church, with a few dissenters. R. is a very ancient town, dating back to the early Christian period, when a monastery was built upon this site in the beginning of the 7th century. The modern town is tolerably well built; the Roman Catholic Church is a handsome structure; and there are considerable remains of the ancient greatness of the place—a castle, a lofty round tower, 80 feet high, and ruins of two abbeys. The only manufacture is coarse woollen cloth, but there is a considerable market for agricultural produce. There are several schools, some with endowments of ancient date.

ROSE (*Rosa*), a genus of plants of the natural order *Rosaceæ*, consisting of shrubs, generally with prickly stems and pinnate leaves, the leaves terminating in a single leaflet; stipules at the base of the leaf stalks; the calyx 5-fid, its tube contracted at the summit, and finally becoming fleshy, and forming a chief part of the fruit; the corolla of five petals; the stamens numerous; the styles springing from the narrowed throat of the calyx, free, or aggregated into a column. The flowers are generally of the red tint well known as *rose-colour*, but sometimes white, more rarely yellow, and sometimes striped. The fruit (*Hip* or *Hep*) consists of the enlarged and coloured tube of the calyx, within which are contained many *Achenia* (q. v.) amidst prickly hairs. The species are very numerous, even after allowance has been made for a great number of varieties elevated into species. There is no genus of plants in which the limits of species are more difficult to define, or in which varieties are more apt to be regarded as species. In Withering's *British Botany*, published near the end of last century, only five British species of R. are given; in Hooker and Arnott's *British Flora*, 19 species are recognised, whilst many forms, reckoned as species by some botanists, are noticed as mere varieties. Roses are natives of all the temperate parts of the northern hemisphere, and of its colder regions, even to Lapland and Hudson's Bay. They have long been among the chief favourites in flower-gardens, for the beauty and fragrance of their flowers; and, more than any other flower, emblems of everything beautiful and delightful. Countless varieties—single and double—have been produced by cultivation, which it is often extremely difficult to refer to their original species.—Amongst the ancients, the R. was sacred to Eros or Cupid, and Aphrodite or Venus, and was accounted the emblem of joy and love, and at the same time of prudence. Its opening buds are a favourite poetic image of innocence and purity.—Among the roses best known to the ancients was the HUNDRED-LEAVED R. (*R. centifolia*), excelled by no other species in beauty and fragrance. It is a native of the Caucasus, and has been cultivated in gardens from very ancient times. Amongst its numberless varieties are the Moss R., the calyx of

which sends forth branching excrescences, so that it seems overgrown with moss, the flower—which is only known as a double rose—being exquisitely beautiful and fragrant; the PROVENCE or CABBAGE R., one of the most common, and also one of the finest roses: the small-flowered BURGUNDY R., &c. —The FRENCH R. (*R. Gallica*) is a native of the south of Europe. Many varieties of it are cultivated, particularly very beautiful double ones. It is distinguished by its hard leaves, which have a peculiar dryness, and its much expanded petals. It has a fainter smell than *R. centifolia*, but its petals are more astringent, and are preferred for the preparation of *Vinegar of Roses* and *Conserve of Roses*.—The DAMASCUS or DAMASK R. (*R. Damascena*), a native of Syria, is much cultivated, and is sometimes called the MONTHLY R., which name, however, is more frequently given to the China Rose.—The MUSK R. (*R. moschata*) is a native of the north of Africa and the south of Spain. Its flowers have a strong and delightful fragrance; they are white, and disposed in rich corymbs. It has been cultivated in England since the end of the 16th century.—The DOG R. (*R. canina*) is common in Britain, and throughout Europe, also in the north of Asia, growing in thickets and hedges. It varies, even in a wild state, in the colour of its flowers, which are red, pale, or white. It has long straight shoots, which are often used as stocks for ornamental rose-trees, other kinds of R. being budded upon them. The bark of the root was formerly esteemed of peculiar virtue in preventing fatal consequences from the bite of a mad dog; whence the name of the species.—The VILLOUS R. (*R. villosa*), another common British species, has the fruit larger and more fleshy than the Dog Rose. The leaves are downy.—The FIELD R. (*R. arvensis*) is common in many parts of Britain, in woods and hedges. It has white flowers. It is remarkable for its trailing habit, and long climbing or pendulous twigs, on account of which it is frequently planted and trained to cover walls and trellises. It is often called the AYRSHIRE R., although that name is shared by another kind of similar habit, which is regarded as a deciduous variety of the EVERGREEN R. (*R. sempervirens*), a native of the south of Europe. These often make shoots of 20 feet in a season. Of the same habit also is the MANY-FLOWERED R. (*R. multiflora*), a native of China and Japan, a very fine species, but not sufficiently hardy for the colder parts of Britain.—Very different in habit is the SCOTCH R., or BURNET-LEAVED R. (*R. spinosissima*), a species common on heaths, sands, and chalk downs, in many parts of Britain; a low compact bush, with very small leaves and flowers. It is occasionally found in unfertile situations, so dwarfed in size as not to measure more than three inches from the very tip of the root to the centre of the flower (which is undiminished in size). Many fine double varieties are now in cultivation.—The ALPINE R. (*R. Alpina*) is a beautiful ornament of the Alps and of other mountains of Central Europe, remarkable for its flower-stalks bending down in an arch after flowering.—The SWEET BRIAR R. (*R. rubiginosa*) is a bushy species, with small leaves and flowers, a native of Britain, but more common in some parts of continental Europe, growing in open bushy places, and remarkable for the sweet balsamic smell of its leaves, on account of which it is much planted in hedges and shrubberies. A kindred species (*R. suaveolens*) is found in North America. —The YELLOW R. (*R. lutea*), a native of Germany, is chiefly remarkable for the colour of its flowers, which, however, have a disagreeable bug-like odour. A fine variety is much cultivated, with petals yellow externally, and bright red on the inside.—The INDIAN R., or CHINA R. (*R. Indica*), is a native of China, was thence carried to India, and is now also common in Europe, being a hardy plant, which does not suffer from the frosts of winter in any part of Britain, although it was at first introduced as a greenhouse plant. It is one of the most important additions recently made to our flower-gardens and shrubberies; flowering not only in the middle of summer, with the other roses, but throughout the year, even in winter, when the weather is mild. It is now very common throughout Europe. The name MONTHLY R. is often given to it from a notion that it flowers every month. The NOISETTE R., remarkable for its extremely rich corymbs, and the TEA R., of which the dried leaves have a fine fragrance, and are said to be used in China for flavouring tea, are regarded as varieties of it. The odour of the flower is much fainter than that of many other roses; and the bush is never large.

Some kinds of R., as the China R., are easily propagated by cuttings, the other kinds by layers. The finer varieties are budded on stocks of some common kind. Many of the kinds require much pruning and attention of the gardener. The old shoots are cut out, and the young wood thinned and shortened. The flowering of a rose-bush may be retarded by cutting it closely down late in spring, and it will blossom when other roses have disappeared. Roses grow well in all ordinary soils, but are very sensitive to atmospheric influences, and do not succeed amidst the smoke of towns.

The genus *Lowea* has been separated from *Rosa* by Lindley, chiefly on account of the simple leaves. The only known species is a native of Central Asia.

The fruit of roses is used in medicine. See HIP. A mildly astringent and agreeable syrup, and other preparations, are made from the rapidly dried petals and buds of the French rose. A syrup is similarly made from the petals of the Hundred-leaved R.; and water distilled from them, *Rose Water*, is employed for various purposes on account of its agreeable odour. *Rose Vinegar*, made by steeping rose petals in vinegar, is useful as an external application in headaches, for dissipating unpleasant smells in apartments, &c. *Conserve of Roses* is made of the petals of roses pounded with sugar, and is useful as an astringent in diarrhœa of children. Oil or Otto (q. v.) of Roses is one of the most valuable of perfumes.

Rose-bushes are often much injured by a species of Aphis (*A. rosæ*), a small green insect, which swarms upon the leaves. A reddish fungus, *Puccinia rosæ*, often covers the leaves in the latter part of summer.

ROSE, in Heraldry. The heraldic rose is drawn in a conventional form, as in the subjoined woodcut, and never with a stalk, except when expressly directed by the words of blazon. Being sometimes argent and sometimes gules, it cannot be designated proper; but when blazoned 'barbed and seeded proper,' it is meant that the barbs are to be green, and the seeds gold or yellow. The rose gules was the badge of the Plantagenets of the House of Lancaster, and the rose argent of that of York. The York rose was sometimes surrounded with rays as of the sun, and termed *rose en soleil*. As a mark of cadency, the rose has been used as the difference of the seventh son.


Rose.

ROSE, THE, a popular name for Erysipelas (q. v.), which is also known as St Anthony's Fire, *Ignis Sacer*, &c.

ROSE ACACIA. See ROBINIA.

ROSE APPLE. See EUGENIA.

ROSE BEETLE (*Cetonia aurata*), a coleopterous insect of the section *Pentamera*, of the tribe *Lamellicornes*, and not distantly allied to cockchafers and to the true beetles, or *Scarabæi*. It is a common British insect about an inch long, of a shining green above, coppery red underneath, with white marks on the elytra. In its perfect state, it frequents flowers, particularly the rose; in its larva state, it inhabits rotten timber, the roots of vines, &c., and is often found in ants' nests, apparently feeding on the small particles of wood which the ants have collected. It remains about three years in the larva state, makes a cocoon of particles of wood, glued together by an excretion of its own, passes the winter as an inactive pupa, and appears in summer in its perfect form. It flies well with a sort of humming noise from flower to flower, feeding on honey, and in order to reach it devouring the nectaries.—In North America the name Rose Beetle is given to another coleopterous insect of the tribe *Clavicornes*, about one third of an inch in length. It is very injurious to gardens and nurseries in North America, its ravages extending to many plants besides the rose. These insects often appear suddenly in swarms and disappear as suddenly.

ROSE ENGINE. See TURNING.

ROSEMARY (*Rosmarinus*), a genus of plants of the natural order *Labiatæ*, and nearly allied to sage (*Salvia*), from which it differs in its filaments having an awl-shaped tooth, directed downwards a little above the base. Only one species is known, *R. officinalis*, an evergreen erect shrub of 4–5 feet high, with linear leaves, and pale bluish flowers, growing in sunny places on rocks, old walls, &c., in the countries around the Mediterranean Sea, and generally cultivated, as an ornamental and aromatic



Rosemary (*Rosmarinus officinalis*.)

shrub, throughout the rest of Europe. The leaves have a short whitish grey down beneath, a penetrating camphor-like odour, and a pungent aromatic and bitter taste. They contain a large quantity of an essential oil, *Oil of R.* ($C_{10}H_{16}O_2$), which is not unfrequently used as a stimulating liniment, to promote the growth of the hair, and as a perfume. *Spirit of R.*, made by distillation of sprigs of R. with rectified spirit, is used to give a pleasant odour to lotions and liniments. R. has been advantageously administered internally in cases of chronic diarrhœa, and of a relaxed state of the system.—Oil of R. is a principal ingredient of the perfume called *Hungary Water*, or *Queen of Hungary's Water*.—The name Wild R. is given to *Ledum palustre*, a shrub with narcotic acrid properties.

ROSEN, FRIEDR. AUG., born in Hanover, September 2, 1805, entered Leipzig University in 1822, where he devoted himself to the study of the biblico-oriental languages, and went to Berlin in 1824, where he studied Sanscrit under Bopp, and published his first work, *Radices Sanscritæ* (Berl. 1827). Subsequently, he was called to London University as Professor of Oriental Literature, where he edited the oldest of the still extant Arabic handbooks of Algebra, by Mohammed ben Musa (Lond. 1831). In 1831, R. resigned his professorship. During the next few years, he wrote a portion of the oriental articles for the *Penny Cyclopædia*, undertook the revision of the Sanscrit-Bengali Dictionary of Houghton (Lond. 1835), which may be considered entirely his own work, and compiled for the British Museum the catalogue of Syrian manuscripts, which was only published after his death (Lond. 1838). As secretary of the Asiatic Society, he conducted its entire foreign correspondence. Colebrooke intrusted to him the publication of his *Miscellaneous Essays* (2 vols., Lond. 1837). In 1836 he had begun the publication of the Collection of Hymns of the *Rigveda*, when he died September 12, 1837. His unfinished work on the Vedas was published by the Asiatic Society under the title *Rig-Vedæ Sanhita, liber primus Sanscrite et Latine* (Lond. 1838). His younger brother GEORG ROSEN, has also acquired a reputation as an oriental scholar.

ROSENAU, a mining and market-town of Hungary, on the Sajo, 105 miles north-east of Pesth. Iron, copper, antimony, and lead mines are in operation; linen bleaching and the manufacture of pottery, leather, wax tapers, and trade in honey and wax, are carried on. Pop. 7000.

ROSENMÜLLER, JOHANN GEORG, a German divine and professor of theology, was born at Ummerstadt in Hildburghausen, 18th December 1736. He was appointed Professor of Theology at Erlangen in 1773, Primarius Professor of Divinity at Giessen in 1783, and was called in 1785 to Leipsic, where he remained till his death in 1815. His chief writings are: *Morgen und Abendandachten* (7th ed., Leip. 1820); *Betrachtungen über die vornehmsten Wahrheiten der Religion auf alle Tage des Jahres* (4 vols. Leip. 1801); *Ausserlesenes Beicht und Communionbuch* (12th ed. Nürnb. 1827); *Predigten über auserlesene Stellen der Heiligen Schrift* (3 vols. Leip. 1811–1813); *Beiträge zur Homiletik* (Leip. 1814); *Scholia in Novum Testamentum* (6 vols. 6th edit. by his son, E. F. K. Rosenmüller, Leip. 1815–1831); and his *Historia Interpretationis Librorum Sacrorum in Ecclesia Christiana* (5 vols. Leip. 1795–1814). After his death appeared *Handbuch eines allgemeines [sic] Christlichen Unterrichts in der Christlichen Glaubens und Sittenlehre* (2 vols. Leip. 1818–1819).—ERNST FRIEDRICH KARL ROSENMÜLLER, eldest son of the foregoing, distinguished himself as a biblical critic and orientalist. He was born at Hessberg in Hildburghausen, 10th December 1768, studied at Leipzig, became Extraordinary Professor of Oriental Literature in 1795, Ordinary Professor in 1813, and died 17th September 1835. He was a more accurate and solid scholar and a keener critic than his father. He shared the rationalism of his time, but never carried it to an extreme. His masterpiece, the *Scholia*

in Vetus Testamentum (11 vols. Leip. 1788—1835), is a most comprehensive and learned production, well worthy of consultation on any important point of biblical criticism. Other works of R.'s are: *Handbuch für die Literatur der biblischen Kritik und Exegese* (4 vols. Gött. 1797–1800); *Das alte und neue Morgenland oder Erläuterungen der Heiligen Schrift* (6 vols. Leip. 1818—1820); *Handbuch der biblischen Alterthumskunde* (4 vols. Leip. 1823—1831); *Institutiones ad Fundamenta Linguæ Arabicæ* (Leip. 1818); and *Analecta Arabica* (3 vols. Leip. 1825–1826).—A younger brother, JOHANN CHRISTIAN ROSENMÜLLER (b. 1771, d. 1820), also acquired a reputation as a writer on anatomy, &c.

ROSE-NOBLE (commonly called also *penny of gold*), an English gold coin, first struck by King Edward III. in 1334, and current at the value of 6*s.* 8*d.* sterling; half-nobles, *oboli*, or gold half-pence, and quarter-nobles, otherwise called *gold farthings* and *quadrantes*, were also coined soon after. The term 'rose-noble' was given to the coin because it was of the same value as the 'noble,' a money of account, and was stamped on one side with the figure of a rose. The Rose-noble and its halves and quarters ceased to be coined after 9 Henry V.; but the 'noble,' the money of account, was used till a much more recent period. The noble also existed in the Scotch coinage, and was equivalent to one-twelfth of the English coin.

ROSE OF JERICHO (*Anastatica hierochuntica*), a plant of the natural order *Cruciferæ*, which grows in the sandy deserts of Arabia; and on rubbish, the roofs of houses, and other such situations, in Syria and other parts of the East. It is a small, bushy, herbaceous plant, seldom more than six inches high; with small white flowers; and after it has flowered, the leaves fall off, and the branches become incurved towards the centre, so that the plant assumes an almost globular form, and in this state it is often blown about by the wind in the desert. When it happens to be blown into water, the branches expand again, and the pods open and let out the seeds. Numerous superstitions are connected with this plant, which is called *Rosa Mariæ*, or *Rose of the Virgin*. If taken up before it is quite withered, the plant retains its hygrometric property of contracting in drought and expanding in moisture, for years.

ROSEO'LA is a common skin disease, included in the division *Rashes*, and sometimes described under the term *Scarlet Rash*. In some cases, it begins with slight febrile symptoms and gastric disturbance, which subside in two or three days, when the rash appears; in other cases, no preliminary fever occurs. The eruption first appears upon the face, neck, and chest, in specks or small patches, which have a tendency to coalesce; and in severe cases, the whole surface of the body assumes a uniformly red tint. The eruption is usually accompanied by itching of the affected parts, and by redness and slight soreness of the throat, and seldom lasts more than two or three days, when it gradually fades away; and its disappearance is not followed by the desquamation of epidermis, which is one of the natural *sequelæ* of scarlatina and certain other skin diseases. The rash differs considerably in appearance in different cases. The disease is never contagious, and one attack affords no immunity from a second.

Among the causes of roseola may be mentioned the irritation excited by dentition, gastric and intestinal irritation, excessive acidity of the stomach, the sudden checking of profuse perspiration, the drinking of cold water when the body is overheated, &c. It often precedes the distinctive eruptions of small-pox and varioloid; and is noticed to be of most frequent occurrence during the prevalence of measles and scarlatina. The diseases with which it may be confounded are erythema, measles, and scarlatina, and it is sometimes impossible to discriminate with certainty between roseola and mild cases of scarlatina, when the former is attended with sore throat. The treatment is very simple, as the disease would probably always terminate favourably if left entirely to itself. If there is a suspicion that the case should turn out to be one of scarlatina, an emetic of ipecacuanha should be given, and the bowels should be freely acted on. In ordinary cases, a few days' confinement to the house, a spare and non-stimulating diet, saline laxatives—such as Seidlitz powders—and an occasional warm bath, if there is much cutaneous irritation, or if the eruption has a tendency to recede too suddenly, constitute all the treatment that is expedient.

ROSES, WAR OF THE, a disastrous civil contest which desolated England during the 30 years from 1455 to 1485, sacrificing 80 princes of the blood, and the larger proportion of the ancient nobility of the country. It was so called because the two factions into which the country was divided upheld the two several claims to the throne of the Houses of York and Lancaster, whose badges were the white and the red rose respectively. After the House of Lancaster had possessed the throne for three generations (see PLANTAGENET), Richard, Duke of York, whose title to the throne was superior to that of Henry VI., began to advance, at first somewhat covertly, his claim to the throne. In 1454, he was appointed Protector of the realm during Henry's illness, and on the king's recovery, he declined to give up his power, and levied an army to maintain it. For an account of the Wars of the Roses, see EDWARD IV., EDWARD V., RICHARD III., and HENRY VII. The accession of Henry VII. may be said to have terminated the Wars of the Roses, although the reign of Henry was from time to time disturbed by the pretensions of Yorkist impostors.

ROSETTA, a city of Egypt, situated on the west bank of the old Bolbitic branch of the Nile, about 4 miles above the mouth, in 31° 25′ N. lat., and 30° 28′ 20″ E. long. The name is supposed to be an old Egyptian one, and to have been derived from *Rusat*, or the mouth of the plains. Here was discovered the so called Rosetta Stone, or trilingual inscription in the hieroglyphic, demotic or enchorial, and Greek language, which was the key to the interpretation of the hieroglyphs. It is of black basalt, about 3 feet 7 inches in length, and 2 feet 6 inches in width, containing about one-third of the hieroglyphic, and nearly all the Greek and Roman portions, the upper part and portion of the side having been broken away. The contents of the inscription are a decree in honour of Ptolemy Epiphanes by the priests of Egypt assembled in a synod at Memphis, on account of his remission of arrears of taxes and dues owed by the sacerdotal body. It was set up 195 B.C., and is the only one of the numerous examples ordered to be placed which has been brought to light. This monument was discovered in 1799 by M. Boussard, a French officer of engineers, during the French occupation of Egypt, in an excavation made at Fort St Julien, near Rosetta. More recent excavations have shewn that it was found on the site of a temple dedicated by the Necho II. of the 26th dynasty to the solar god Atum, or Tum. By the Arabs, R. is called Rashid. It first rose into importance when the accumulation of mud had silted up the Damietta branch, and destroyed the importance of that city. It has been much praised for its verdure and charming gardens, which

present an agreeable contrast to the barren wastes by which it is surrounded. It contains a mixed population, supposed to be about 15,000 in number. The streets are narrow, running north and south. The river has a sandbar at the mouth, preventing the entrance of large ships-of-war. It was unsuccessfully attacked by the British in 1807.

ROSETTA WOOD is a furniture-wood of a lively orange-red colour, with very dark veins. It is imported from the East Indies in logs about a foot in diameter; but it is not known what tree produces it. It is little used, because, although extremely beautiful when first cut, the colours become dark by exposure.

ROSE QUARTZ, a variety of Quartz (q. v.), often crystallised in the form of Rock-crystal (q. v.), but also found massive or imperfectly crystallised. It differs from common quartz and rock-crystal chiefly in its colour, which is of a delicate pink or flesh colour, sometimes crimson or nearly so. The colour is due to the presence of manganese. R. Q. is valued as an ornamental stone, the larger masses being made into vases, &c., the smaller pieces into jewels, seals, &c. A bright red kind is known as *Bohemian Ruby*, and is sometimes fraudulently sold as ruby.

ROSE-WATER. See PERFUMES.

ROSE-WINDOW, a circular window with tracery.

RO'SEWOOD, a name given to the wood of a number of different trees, valued for beauty, and used for ornamental furniture.—The R. of commerce has been thought to be the produce of a species of *Mimosa*, a native of Brazil. It is also said that R. is the timber of several species of *Triptolomea* (natural order *Leguminosæ*, suborder *Papilionaceæ*); but the trees yielding R. are, in general, still doubtful to the botanist, although different kinds of R., imported from South America, are much used for veneering, in making furniture, musical instruments, &c. R. has for a long time been second only to mahogany as a furniture-wood in Europe. It has a dark blackish-brown colour, beautifully marked with streaks of dark red, and when being sawn or cut, yields an agreeable smell of roses, from which it receives its name. We receive it chiefly from Para and Maranham, in logs usually about ten feet in length; each log is only half the trunk, which is split in two to be sure it is sound. Last year (1864), the imports of this wood into Great Britain amounted to 2126 tons, of the value of £25,539. One valuable kind of R. is yielded by an East Indian tree, *Dalbergia latifolia*, also called *Blackwood*. It is found chiefly in Malabar, and grows to a height of about 50 feet, with handsome spreading branches and pinnate leaves. It is of the natural order *Leguminosæ*, suborder *Papilionaceæ*. The timber is very valuable. It is much used in Bombay for ornamental furniture. Planks of 4 feet in breadth are sometimes obtained, after the sapwood has been removed. The increasing value of the wood has led to the formation of new plantations, under the care of the government conservator of forests, in several parts of the Madras presidency.

ROSICRU'CIANS, the name of a secret society of the 17th c., which is involved in much mystery, and the history of which has led to a great deal of discussion. The name is explained by Mosheim and others, as derived from *ros*, dew, and *crux*, the cross. CRUX is supposed mystically to represent LUX or light, because the figure + exhibits the three letters LVX; and light, in the opinion of the Rosicrucians, is that which produces gold. Now dew (*ros*) is the greatest solvent of gold in the ancient science of alchemy. But without insisting on this very mysterious explanation of the name Rosicrucians, we must be content with an account of the association itself. The beginning of the 17th c. was a period which manifested an extraordinary tendency to mysticism in science as well as in religion; alchemy, astrology, and divination divided the public interest with Pietism in the Protestant world, and the Convulsionist mania in the Catholic community. A remarkable impulse was given to this tendency by the simultaneous appearance of two anonymous books, printed at Cassel in 1614, in German, entitled *Universal and General Reformation of the whole wide World;* together with the *Fama Fraternitatis, or Brotherhood of the Illustrious Order of the R. C. (Rosy Cross); to the Rulers, States, and Learned of Europe; printed at Cassel, by William Wessel.* The first of these books is a kind of mystic allegory. In the reign of Justinian, Apollo, finding the world full of every kind of corruption, resolves on effecting a reformation; and with this view, calls up the seven wise men of Greece, and three Roman philosophers, of whom Cato and Seneca are the chief advisers. Their deliberation forms the subject of the book, which is a satire at once on the philosophy and the political systems and governments of the age. The *Fama Fraternitatis* is the story of a certain holy and reverend Brother Christian Rosenkreuz (i. e., Rosy Cross), who is represented as living in the 14th century. This Father, a German of noble birth, having been educated in a monastery, conceives a design for the reformation of the world; and after learning at Jerusalem and Damascus all the science of the Arabians, spends three years at Fez, in Morocco, in the study of the magical science of the Moors, and returns to Germany, where he establishes, in a house under the title Sancti Spiritus, with the aid of seven monks from the convent where he had been educated, a fraternity, which is the original brotherhood of the Rosy Cross. These adepts having framed a system with secret symbols, and committed it to paper, sent forth Father Rosenkreuz to propagate the brotherhood, which was to be kept secret for 100 years, the members, however, meeting once each year in the mother-house of Sancti Spiritus. Rosenkreuz died at the age of 106, and the place of his burial was held secret by the adepts; but he ordered that an inscription should be placed on one of the doors of Sancti Spiritus: 'Post cxx. annos patebo.' In the following year, 1615, a third tract appeared, also in German, entitled *Confessio, or Confession of the Society and Brotherhood R. C.*, which purports to be a defence of the brotherhood from the false rumours in circulation regarding it. The mixture of absurdity with seeming fanaticism displayed in these books has long proved a literary puzzle, of which not the least plausible solution is that which regards them as simply a serio-comic satire on the philosophical follies of the time, written by Johann Valentine Andreä, of Herrenberg, as a mere exercise of humour, and without the intention or the expectation of their serious acceptance. Certain it is, that whatever was the secret of the Rosicrucians, if there really was any, it has been well kept. They are not heard of for the rest of the 17th c., and their supposed connection with the Illuminati of Weishaupt, at the close of the 18th c., is more than doubtful. Equally doubtful is the theory of their connection with the Templars. From a book entitled *Curious Things of the Outside World: Last Fire* (Lond. 1861), it would appear that the Brethren of the Rosy Cross are not yet extinct. See Buhle,

Uber Ursprung und Schicksale des Ordens der Rosenkreuzer (Gött. 1803).

ROSIN, CHEMISTRY OF. See RESINS. When common Turpentine (q. v.), obtained from several species of Pine (q. v.) and Fir (q. v.), is distilled with water, it yields nearly one-fourth of its weight of essential oil, while the residue in the retort consists of *common rosin*, or colophony. There are two principal varieties of rosin, one of which is of a brown, and the other of a white colour. The brown variety is furnished by the Norway Spruce Fir, and is an amber-coloured brittle solid, consisting of two isomeric acids, the *sylvic* and *pinic*, having the common formula, $C_{40}H_{29}O_3$,HO. Pinic acid, which is the more abundant of the two, is soluble in cold alcohol, from which it is obtained on evaporation as an amorphous mass. When heated to partial decomposition, it yields another isomeric acid, the *colophonic*. The white variety of rosin, known commercially as *Galipot*, is obtained from the turpentine yielded by *Pinus maritima* (see PINE), and consists almost entirely of an acid, isomeric with the preceding, and termed the *pimaric*. On evaporating its alcoholic solution, the acid is obtained in a semi-crystalline form; and on melting the mass thus obtained, and allowing it to cool, the resulting product is a colourless glass as clear as crystal.

Common rosin dissolves freely in alkaline solutions, and enters largely into the formation of yellow soap. The alkaline resinates are, in point of fact, true soaps, but are inferior in their cleansing properties to the stearates, oleates, and margarates. All the above described acids of rosin are monobasic, soluble in ether and hot alcohol, and insoluble in water.

ROSS, SIR JOHN, C.B., Arctic voyager, born June 24, 1777, at Balsarroch, Wigtonshire, was a son of the Rev. Andrew Ross of Inch. He entered the navy at the early age of 10, was 15 years a midshipman, 7 years a lieutenant, 7 years a commander, and became a post-captain in 1818. When lieutenant of the *Surinam*, he was wounded in cutting out a Spanish vessel from under the batteries of Bilbao, in 1806. During the war, he was in three different actions. His more important services were rendered in the Arctic regions, whither, in 1818, he proceeded with Sir W. G. Parry. See NORTH-WEST PASSAGE. He published the results of his investigations in 1819. In May 1829, he was employed on a fresh expedition to the Arctic regions (fitted out at his own expense by Sir Felix Booth), and discovered the peninsula of 'Boothia Felix.' R. received, on his return, the honour of knighthood, and was made C.B. He received the freedom of London and other cities, gold medals from the Geographical Societies of London and Paris, was made a knight of various foreign orders, and received other acknowledgments of his services. In 1838, he was appointed British consul at Stockholm, where he remained some years. He was author of *Letters to Young Sea-officers; Residence in Arctic Regions*, &c. (1829—1834), 4to; Appendix to same, 4to; *Memoirs and Correspondence of Admiral Lord de Saumarez*, 2 vols. 8vo; *Treatise on Navigation by Steam*, 4to. He became a rear-admiral in 1851, and died August 30, 1856, at his house in Gillingham Street, Pimlico.

ROSS, SIR JAMES CLARK, Arctic explorer (nephew of the preceding), third son of George Ross, Esq., of Balsarroch, Wigtonshire, was born in London, April 15, 1800. He entered the navy in his 12th year, and served under his uncle in the Baltic, the White Sea, the coast of Scotland, and in all the naval expeditions for the discovery of the North-west Passage (q. v.) from 1818 to 1833. It was while accompanying his uncle in his second Arctic voyage that he discovered, 1831, the North magnetic pole, and on his return he was rewarded with a post-captaincy. Afterwards employed by the Admiralty in a magnetic survey of Great Britain and Ireland, he, in 1836, crossed the Atlantic to relieve the frozen whalers in Baffin's Bay; and in 1839 he was placed in command of an expedition to the Antarctic seas (see POLAR EXPEDITIONS), and approached within 160 miles of the South magnetic pole. On his return in 1843, he received the honour of knighthood; and in 1847 he published his *Voyage of Discovery in Southern Seas*, 1839—1843. In January 1848, he made a voyage in the *Enterprise* to Baffin's Bay, in search of Sir John Franklin, but without success. He received the 'Founder's gold medal' from the Geographical Society of London in 1841, and the gold medal of the Paris Society; and was made D.C.L. of Oxford in 1844.

ROSS, a Celtic word, meaning a headland, occurring as the name or part of the name of many places in the British Islands, and in other parts of Europe, as Roslin, Culross, Rossberg, Ross (in England), Montrose, Roxburgh, Ardrossan. There is another Welsh root, *rhos*, signifying a moor, which is found in Welsh and Cornish names, as Rossall, Rusholme. In Roseness, in Orkney, the equivalent Teutonic term *ness* has been superadded after the meaning of the Celtic *ross* had been lost.

ROSS, a thriving market-town in Herefordshire, is finely situated on the left bank of the Wye, 14 miles south-south-east of Hereford. In the parish church (date 1316) is buried John Kyrle, celebrated by Pope as the 'Man of Ross' (q. v.). The town is well furnished with schools, carries on a trade in cider, malt, and wool; is much visited by tourists, and contained, 1861, 3715 inhabitants.

ROSS AND CROMARTY, treated of in the 'Census of Scotland—1861,' as one Scottish county, is, as such, bounded on the N. by Sutherlandshire, E. by the German Ocean, S. by Inverness-shire, and W. by the Atlantic. Ross comprises the districts of Easter and Wester Ross, Ardmeanach, or the Black Isle, and the island of Lewis (q. v.). R. and C., in many parts, present a wild and mountainous aspect, intersected by beautiful glens, valleys, lakes, and rivers. Many of the mountains are of considerable altitude, the highest ranging from 3000 to 4000 feet, the most remarkable of which is Ben Wyvis. The high grounds afford excellent pasture for sheep and cattle, and the glens and low grounds, in the more favoured portions, are generally of a superior soil, which, with the fine climate, especially in Easter Ross, produce grain of a superior quality. There are numerous fresh-water lakes and rivers. The principal loch is Maree (q. v.). There are several other lakes of considerable size, which altogether occupy an area of 90 sq. miles. There are numerous water-courses, the chief of which are the rivers Oikel and Conon, and several high waterfalls, the principal being Glomach, one of the finest in the kingdom. Limestone and ironstone are to be met with in abundance, as also granite and mica slate; and there are various mineral springs of note, the most famous of which is that of Strathpeffer. About the beginning of last century, the country in many places was nearly devoid of trees, but soon after, numerous plantations were formed, and many parts are now occupied by extensive forests. The lakes, rivers, and coast abound with fish, and the bays and sea-lochs being numerous, the fisheries are carried on extensively, occupying upwards of 22,000 persons.

The number of proprietors is 117, and occupants 865. The area of the two counties is 3157 sq. m., or

2,020,480 acres; of which, in 1857, there were under grass and hay 20,868; and under rotation of crops 72,851—viz: In wheat 9715 acres, yielding 26 bushels 2¾ pecks per acre; barley 6435 acres, 32 bushels 3¼ pecks average; oats 16,256 acres, 33 bushels 1 peck average; bere 289 acres, 30 bushels 2¼ pecks average; turnips 12,228 acres, 12 tons 1 cwt. average; potatoes 4471 acres, 1 ton 19½ cwt. average. Of live stock there were horses 4759, cattle 17,610, sheep 304,444, swine 4568; total stock 331,381.

The population of the united shires in 1861 was 81,406; the inhabited houses, 15,728. The parliamentary constituency, which returns one member to parliament, is 945 in number. The chief towns are Dingwall (q. v.), Fortrose (q. v.), and Tain (q. v.).

ROSS, The Man of, a name given by Pope to John Kyrle, an English gentleman of great benevolence, who was born at Whitehouse, Gloucestershire, in the first half of the 17th century. Kyrle received his appellation from having resided during the greater part of his life in the small town of Ross, Herefordshire. He there spent his time and fortune in building churches and hospitals, which procured for him the love and veneration of his contemporaries. Kyrle may be considered the Howard of his age; and Warton, in his *Essay on the Writings and Genius of Pope*, has stated that he deserved to be celebrated beyond any of the heroes of Pindar.

Pope, during his visits at the old mansion of Holm Lacy, the seat of Viscount Scudamore, near Ross, heard so much of Kyrle's beneficence, that in his *Moral Essays* he celebrates his praises under the name of the Man of Ross:

'Behold the market-place with poor o'erspread!
The Man of Ross divides the weekly bread:
He feeds yon almshouse, neat, but void of state,
Where age and want sit smiling at the gate:
Him portioned maids, apprenticed orphans blessed,
The young who labour, and the old who rest.'

We learn further, from the same poem, that the fortune of Kyrle was no more than £500 a year. Kyrle died in 1724, and was buried in the church of Ross.

ROSSA'NO, a city of Southern Italy, in the province of Calabria Citra, is situated at the foot of the Apennines, 2 miles from the Gulf of Taranto, on a high rocky hill, surrounded by steep precipices. It is walled and well-built, is defended by a castle, and contains a beautiful cathedral, inlaid with carved marbles. Its fields are very fertile, producing grapes and lemons. R. was laid waste by Totila, king of the Goths. Pop. 14,257.

RO'SSBACH, a village in Prussian Saxony, in the government of Merseburg, and 8 miles south-west of the city of that name, is celebrated in history for the victory here gained by the Prussians under Frederick the Great over the combined French and Imperialist armies on 5th November 1757. A short time previously, Frederick had been compelled to leave the bulk of his army in Silesia under the Duke of Brunswick-Bevern to check the Austrians on this side, and hastened with 22,000 men to oppose the invasion from the west. The Prince of Soubise (one of the 'amateur' French generals of the period), who was at the head of the confederate army of 60,000 men, thinking from Frederick's cautious manœuvres that he was terrified and desirous of retreating, at once charged forward with his cavalry, and left his columns at the mercy of General Seidlitz, who attacked them in front and flank with the whole of the Prussian cavalry and artillery. The confederates were speedily thrown into utter disorder, and, being charged in front by the Prussian infantry under Prince Henry, their rout was complete. The 'rout of Rossbach' was so utterly disgraceful that it remained for a long time proverbial in the French army. The Prussians lost (according to a French account) only 300 men, while the loss of the allies was more than 1200 slain, 6000 prisoners, among whom were 11 generals and 300 officers, and 72 cannon, with many other trophies.

ROSSE, William Parsons, third Earl of, a well-known practical astronomer, was born in York in 1800, and educated first at Trinity College, Dublin, and afterwards at Magdalen College, Oxford, where he graduated first-class in Mathematics in 1822. During the life of his father, he sat in the House of Commons as Lord Oxmantown, representing King's County from 1821 to 1831; he succeeded to the peerage in 1841, and was elected a representative peer for Ireland in 1845. At an early age R. had devoted much attention to the study of practical science, and especially to the improvement of the telescope, and had commenced as far back as 1826 to make experiments in the construction of fluid lenses (see *Philosophical Transactions* for 1840), but he subsequently relinquished those investigations, to engage himself with the problem of the best mode of constructing the speculum of the reflecting telescope. The two great defects which had hitherto baffled opticians were 'spherical aberration' and absorption of light by specula; and in the casting of these of large size, there was the apparent impossibility of preventing cracking and warping of the surface on cooling. However, by a long series of carefully conducted experiments, he succeeded in discovering a mode of operation by which the last defect was wholly obviated, and the two others greatly diminished in amount. The metal for the speculum of his great telescope (see Telescope), three tons' weight, was poured into the iron mould April 1842, the crucibles being lifted and emptied by means of cranes; and the mould was kept in an annealing oven for 16 weeks, so that the metal should cool equably. It was then polished and mounted in his park at Parsonstown, at a cost of £30,000, the adjustments consisting of a system of chains, pulleys, and counterpoising weights, so complete in all its parts, that the ponderous instrument of 12 tons' weight can be moved so as to point in any direction, and with almost as much precision as the ordinary equatorial of the observatory. The first addition to the body of astronomical knowledge made by this telescope was the resolution of certain nebulæ, which had defied Herschel's instrument, into groups of stars; next came the discovery of numerous binary and trinary stars, and a description of the moon's surface. The construction of this telescope, which was wholly effected under R.'s personal direction and superintendence, is fully described in the *Philosophical Transactions*.

ROSSETTI, Gabriele, a celebrated Italian author, was born at Vasto in 1783, and came to England as a political refugee in 1824. Two years afterwards he published the *Comento Analitico* on the *Divina Commedia* of Dante, in which he aimed to shew that in the middle ages all the poets used a jargon under which they veiled their hatred of the papacy, and concealed the true religion under the form of a woman beloved by them. In conducting this argument he displayed amazing erudition. His opinions naturally excited a great deal of hostile criticism. R. replied to his opponents with the work, *Sullo Spirito Antipapale che produsse la Riforma, e sulla influenza che esercitò nella letteratura di tutta l'Europa e principalmente d'Italia* (1830). But this book did not convince them

either, and then R. sought to reduce to method his system, and published *Il Mistero dell' Amor Platonico svelato* (1840), and *La Beatrice di Dante*. Whatever may be thought of R., he has at least founded a new school of interpretation of Dante, and his partisans are numerous in Italy. His name is well known in the peninsula for his national poems, which have gained for him the title of the Italian Tyrtæus. These are contained in the *Dio e l'Uomo* (1840); *Il Veggente in Solitudine* (1846); *L'Arpa Evangelica* (1852); *Poesie di Gabriele Rossetti* (1847). He was Professor of Italian Literature in King's College, London, and was honoured and esteemed by many of the most eminent public men in England. He died in London in 1854.

ROSSETTI, Danté Gabriele, son of the former, distinguished as a thoughtful and powerful painter, and as a faithful and elegant translator of early Italian poetry, was born in London in 1828, and educated at King's College, London. As a painter, he is more talked of than known, probably because his works are transferred into private collections as soon as they leave his studio, and without undergoing the publicity of exhibition. Although he has never exhibited at the 'Royal Academy,' his pictures are occasionally sent by their proprietors to various public picture-galleries. Of these, his 'Fair Rosamond,' a picture pervaded by earnest thought, and treated in a powerful, though strikingly unconventional manner, was exhibited in the galleries of the Royal Scottish Academy in 1860 1861, and may be taken as a good example of the artist's manner. Of his other pictures, the chief are 'Ecce Ancilla Domini,' and 'Beatrice Dead.' He contributed some fine drawings to an illustrated edition of Tennyson, which, although inadequately engraved, rank among the first of modern woodcuts. These, like everything this artist has produced, are strongly imbued with the spirit of the Romantic period. R.'s name was first brought prominently forward by his association with Millais and Holman Hunt in the 'Pre-Raphaelite Brotherhood.' In 1850, he was editor of *The Germ*, a magazine of poetry and art devoted to the furtherance of the views of the 'Brethren,' and to the inculcation of their fundamental principle, which was direct study from nature herself, unfettered by the conventionalities of the 'antique' and 'academies.' While time and experience have modified the practice of some of the original pre-Raphaelites, R.'s pictures still display the peculiarities of earlier days. As an author, R. is best known by his *Early Italian Poets from Ciullo d'Alcamo to Dante Alighieri* (1100—1200—1300) (Lond. Smith, Elder, & Co., 1861). In this work, the translator achieves the rare success of not only catching the spirit of Dante, but of rendering the great poet in his own metres, and with a marvellous fidelity of thought and phrase. In conjunction with his brother William, he edited Gilchrist's *Life of William Blake, Pictor Ignotus* (Lond. 1863), left incomplete at the death of the original compiler.

R. is not only a painter and author, but a man of thorough acquaintance with and high accomplishment in applied and decorative art. He bears a distinguished part in the resuscitation of Gothic art in England, both ecclesiastical and domestic, and is intimately associated with the now well-known firm of Morris, Marshall, and Faulkner, which bears to *decorative* art an analogous position to that occupied by the pre-Raphaelite school in relation to pictorial art.—Christina Gabriella Rossetti, sister of the above, and born about 1835, is the authoress of *Goblin Market and other Poems* (Cambridge, 1862), to which work she owes a considerable literary reputation.

ROSSI, Pellegrino, was born of a noble family at Carrara in 1787. He carried on his studies at the university of Bologna. In 1812, being 25 years of age, he was appointed Professor of Law in that university. In 1815, King Murat having proclaimed Italian independence, R. sided with him. On the fall of Murat, R. was exiled. He took refuge at Geneva, where he was appointed Professor of the Science of Law. There he published *Le Droit Pénal*, a very learned work, which made him famous in France. In 1833, Louis-Philippe called him to Paris, and appointed him Professor of Political Economy. Then R. commenced the course *Du Droit Constitutionnel*, and the government, in order to reward the great publicist, naturalised him, and made him a member of the Chamber of Peers. Protected by Guizot, the prime minister, R. was sent to Rome as ambassador in 1845. There he witnessed all the events of 1848 and took part in them, having again become an Italian subject after the fall of Louis-Philippe. When called to the ministry by Pius IX., R. wished to oppose the party favourable to the House of Savoy, and devised an alliance with the king of Naples, which had for its object a confederation of Italian princes with the pope as their president. This roused the hatred of the Romans, and R. was stabbed by an unknown hand on the 15th November 1848. In 1860, Luigi Carlo Farini decreed the publication of all the writings of R., and that a bust of him should be given to the university of Bologna, where it was inaugurated with great solemnity on the 27th April 1862.—Besides the *Droit Pénal*, R. published the *Cours d'Economie Politique* (1840); the *Lettere d'un Dilettante Politico sull' Allemagna sulla Francia e sull' Italia* (Florence, 1848); and left many inedited writings, which are now being published in Paris at the expense of the Italian government.

ROSSINI, Gioacchino, the greatest composer of the present century for the Italian lyrical stage. He was born at Pesaro in 1792, the son of a horn-player in an orchestra of strolling players. At the age of fifteen, the Countess Perticari, discovering his talent, sent him to study at the lyceum of Bologna, where he received instructions in counterpoint from Padre Mattei. He was, however, principally self-taught, giving days and nights to the study of the great Italian and German masters. Passing over a few juvenile efforts, his first important opera was *Tancredi*, which was first performed in Venice in 1813, and excited an extraordinary sensation throughout the musical world, raising its composer at once to the summit of fame. It was followed in succession by *L'Italiana in Algeri* (1813), *Il Turco in Italia* (1814), and *Aureliano in Palmira* (1814), all inferior to *Tancredi*. In 1815, R. was appointed musical-director of the theatre of San Carlo at Naples; and while holding that position he continued to produce operas both at Naples and elsewhere. *Il Barbiere di Seviglia*, the most popular of all his works, was produced at Rome in 1816, and said to have been composed in twenty days; it was followed by *Otello* in the same year; and in 1817, appeared *La Cenerentola* at Rome, and *La Gazza ladra* at Naples. From this time to the close of R.'s engagement at Naples in 1823, he wrote the operas, of *Mosè in Egitto*, *La Donna del Lago*, *Maometto Secondo* (otherwise known as *L'Assedio di Corinto*) and *Zelmira*. In 1823, he produced *Semiramide*, the most gorgeous of his operas, at Venice, and soon afterwards left Italy. He visited first Paris, and then London, where he was received with great enthusiasm. Returning to Paris, he received from Charles X. the appointment of director of the Italian Opera in Paris, and while there composed his *Guillaume Tell* (1829),

which, though ill-constructed as a drama, ranks musically as high as any of his works. When the revolution of 1830 broke out, R. lost the management of the Italian Opera, but continued to live for some time in Paris; in 1836, he returned to Italy, where, with the exception of a visit to Paris, he has since principally resided. With *Guillaume Tell* he may almost be said to have closed his career, having since composed nothing of importance except his well-known *Stabat Mater*, a pretty and popular work more secular than sacred in its style of music. Large offers from the managers of opera-houses have not succeeded in tempting him from his retirement. His statue was inaugurated at Pesaro in 1864, amid a large concourse of Italian statesmen and men of letters. In R.'s early works he developed with great felicity the type established by his Italian predecessors. These compositions are characterised by stirring melody, brilliant instrumentation, and a highly enjoyable vivacity. *Guillaume Tell*, though equally original, approaches far more nearly to the character of the German school. Much as R.'s music continues to be prized, only four of his forty operas, composed from 1810 to 1829, have kept the stage, *Il Barbiere*, *Otello*, *La Gazza ladra*, and *Semiramide*.

ROSSO ANTICO, the technical name for the red porphyry of Egypt. It consists of a red felspathic base, in which are disseminated rose-coloured crystals of oligoclase with some plates of hornblende, and grains of oxidised iron ore.

RO'STER (corrupted from Register) is a fixed order preserved in military departments as the rotation in which individuals, companies, or larger bodies are called on to serve. Regiments proceed on foreign service according to the roster.

RO'STOCK, the most important town and seaport of the grand duchy of Mecklenburg-Schwerin, stands in a flat fruitful district on the Warnow, 9 miles from the mouth of that river in the Baltic, and 55 miles north-east of Schwerin by railway. It is surrounded by ramparts and walls pierced by 12 gates, and has still a medieval aspect. The university, founded in 1419, maintains 23 ordinary professors, and has a library of 90,000 volumes. In St Mary's Church, a large building dating from the 13th c., and possessing one of the finest organs in Germany, is the tomb of Grotius. St Peter's, dating from the 12th c., has a tower 420 feet high. There are several squares, of which Blucher's Square contains a colossal monument of the general of that name. Manufactures of linen and tobacco, and tanning, brewing, and distilling are carried on. In 1863, 582 vessels of 62,654 tons entered, and 548 vessels cleared the port. In the same year R. owned 387 vessels. The exports are chiefly wheat, barley, oil-cakes, and cattle-bones to Great Britain. The imports are coals, salt, iron, limestone, herrings and other provisions, timber, &c. At the mouth of the Warnow is Warnemünde, the port of R., at which all vessels drawing more than 10 feet, load and unload. Pop. of R., 26,149.—R. is of Slavic origin, and a shadowy glimpse of it is got in the 11th or 12 c., but the progress of commerce and other causes, chiefly political, rapidly Germanised it, and in 1218 it figures as wholly German. It was a member for centuries of the old Hanseatic League, long ranked in importance with Lübeck, and still enjoys to a wonderful extent its ancient privileges—the municipal constitution of the town being even yet almost wholly republican.

ROSTO'F, a town of European Russia, and one of the most ancient in the empire, in the government of Jaroslav, stands on the banks of Lake Nero or Rostofsky. An important fair is held here, and a flourishing commerce, which the railway from Jaroslav to Moscow promises to increase, is carried on. R. contains 20 factories, the chief manufacture being that of linen. Pop. 16,292.

ROSTOF ON THE DON, a district town and ferry of South Russia, occupies an elevated position on the right bank of the Don, and at the head of the delta of that river. It owes its origin to the foundation of the fortress of St Dmetri here in 1749, since which time the progress of the town, owing to its advantageous situation, has been so great that it is now the centre of trade in South Russia. Its custom-house was erected in 1835, and in that year the customs' dues amounted to £150,000. In 1863, the whole exports amounted to £1,198,526, the principal articles being wheat, iron, tallow, and linseed. Manufactures are carried on with activity in 22 factories, the principal articles produced being cast-iron, bricks, ropes, tobacco, maccaroni, soap, and leather, amounting in value to £47,100. Pop. about 15,000.

ROSTOPCHINE, FEODOR VASSILEVITCH, COUNT, a Russian general, directly descended from Genghiz Khan, was born in the province of Orel, March 23, 1765; and, after having filled for some time the office of page to Catharine II., entered the Russian military service as a lieutenant in the Imperial Guard. In 1784 he set out on a course of foreign travel, returning to St Petersburg in 1792, and obtaining, through the powerful influence of some friends, the post of gentleman-of-the-chamber. Having the good fortune to be the first messenger to Paul of his accession to the throne, he was immediately (1796) created general, a rise in rank speedily followed by the successive appointments of grand-marshal of the court, minister of foreign affairs, count (1799), and chevalier of all the Russian orders. R. possessed extraordinary influence over the mind of the half-witted monarch, and succeeded in preventing his vagaries from seriously affecting the government or religion of the empire; but he was repeatedly banished from court and almost immediately recalled, and it was during the last of these banishments (to Moscow) that the czar was murdered. The Emperor Alexander seems to have disliked him, for R. remained in a state of banishment till May 1812, when, having need of the services of all his subjects, and knowing R.'s distinguished patriotism, Alexander appointed him governor of Moscow. On the approach of the French, R., by extraordinary exertions, raised an army of 122,000 men fully equipped, but to his great chagrin was ordered to evacuate Moscow. R. has been unanimously branded by the French writers as the burner of Moscow, and for a long time this was generally credited in the west, till, in 1823, he published in his own defence, *La Verité sur l'Incendie de Moscow* (Paris, 1823), in which he rebuts the charge, affirming that this barbarous action was due in part to the fervid patriotism of a few of the inhabitants, and in part to the violence and negligence of the French. At the same time, he shewed that the damage done to Moscow was much less than the estimate given by French and English writers, and that the Kremlin, which the French had attempted to blow up, had been in reality little injured. R. certainly set fire to his own mansion-house in the neighbourhood, but no other act of incendiarism has been proved against him, the accusations published in the *British Monitor* (1822) having been triumphantly rebutted. He had succeeded in repairing much of the damage done to the city, and in re-collecting many of its former inhabitants, when, through a court intrigue, his dismissal from office was effected (August 30,

1814). R. accompanied the Emperor Alexander to the Congress of Vienna, and subsequently (1817) retired to Paris, where he occupied himself in literary pursuits, and in forming a fine collection of pictures and books. In 1825, he returned to Russia, and died January 30, 1826, at Moscow. His wife and one of his sons have made for themselves names in literature, and his daughter-in-law, the Countess EUDOXIA ROSTOPCHINE, is considered as one of the first poets of Russia. R.'s works, which include a number of historical memoirs, comedies, &c., in Russian and French, were collected and published at St Petersburg in 1853.

ROT is known in the south-western counties of England under the provincial names of bane, coa, or coathe. It consists in the maturation within the liver and biliary ducts of an entozoon, the *Distoma hepaticum*, or Fluke (q. v.). Although most frequent amongst sheep, it also occasionally attacks rabbits, hares, deer, and cattle. Until of late years, the annual losses amongst the flocks of Great Britain were estimated at a million; but in 1809, 1824, 1830, and 1833, this large mortality is believed to have been doubled. During the wet winter of 1852—1853, and again in the autumn of 1860, and early months of 1861, rot was extensively prevalent. Autumn and early winter are the periods of its most frequent occurrence. Close damp weather, inducing a rapid growth of soft, luxuriant herbage, favours its development. The rising of the Nile is said to rot annually 16,000 sheep. Low, damp, marshy situations, water-meadows, undrained lands, especially when of a clayey, retentive consistence, furnish a large proportion of cases. The hay from such localities induces rot almost as readily as the fresh grass. Sheep grazed even for a few hours upon land subject to rot, or taking a single draught from an infected stagnant pool, may contract the disorder, most probably by swallowing the young flukes. From 15 to 40 days usually elapse before any serious consequences follow from the presence of the parasite. At first, indeed, digestion appears to be stimulated, and the sheep thrive rather better than before; but by and by they rapidly waste, their wool becomes dry, and easily detached, their bowels irregular, their skin and mucous membranes yellow, as is usually conveniently observed by examining the eye and its pearly caruncle, which in rot loses the brilliancy of health, and exhibits a dingy yellow hue. The body, after death, is soft, flaccid, and indifferently nourished; watery effusions are discovered underneath the jaws and in other dependent parts; the small quantities of unabsorbed fat have a dirty yellow colour; the liver is soft and enlarged, and usually mottled with patches of congestion. In the thick and muddy bile, the flukes, with their myriads of spawn, float in variable numbers.

The treatment of rot is seldom very satisfactory; and if the animals, when first affected, are in tolerable condition, no time should be lost in having them slaughtered. If remedial measures are attempted, the sheep should be removed to a dry and sound situation, and liberally supplied with dry nutritive food. During the summer, allow corn or cake with the grass; during the winter, when cases are most frequent, supply clover-hay, pease, or split beans, a little bruised linseed cake, and a few roots: pieces of rock-salt should also be laid about the ground, for the patients to lick at. Medicines are seldom of much avail. Those most to be relied on are turpentine and powdered gentian in two-drachm doses, given daily, beat up with an egg and a little milk, or with some linseed gruel. The turpentine, besides acting beneficially as a stimulant, doubtless also exercises a poisonous action on the flukes, whilst the gentian imparts tone to the irritable and relaxed bowels. The prevention of rot is usually effected by removing from the land all superfluous moisture by deep and thorough drainage. The improvement of unsound herbage may subsequently be expedited by dressings of lime, salt, soil, or composts of farm-yard manure and earth. On all suspicious grazings, beans and oats should for a time be given in moderate quantity, and access allowed to rock-salt. The Arab and Bedouin shepherds have for centuries recognised the importance of such measures, for, when their flocks become rotten from depasturing on the rank herbage that shoots up after the risings of the Nile, they often prevent serious loss by promptly transferring them to the desert, where the dry forage-plants are very rich in saline matters. The Australian flock-master likewise checks the complaint by promptly removing his sheep, which have become tainted, from the deep alluvial soils to the poorer upland 'salt brash' countries. In like manner, the salt marshes of Cheshire, and the saltings left along our coasts by the tides, have long enjoyed a well-deserved celebrity in the prevention, and even in early cases, in the cure of sheep-rot.

ROTANG. See RATTAN.

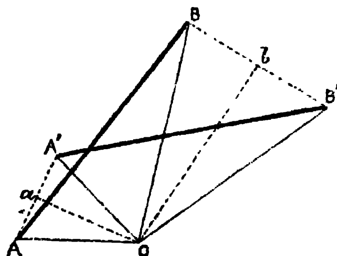
ROTA'TION (Lat. *rota*). There is, perhaps, no elementary idea which has been the subject of so much popular misconception as that of rotation. This is probably due to the vagueness of the definitions commonly given.

All motion that we can observe is *relative;* for instance, any fixed object on the earth's surface has a certain motion *relative* to the earth's axis, in consequence of the diurnal rotation; the earth itself has a certain motion *relative* to the sun, in consequence of its annual revolution; the sun has a certain motion *relative* to the so-called fixed stars; and it is possible that the whole stellar system may have a motion *relative* to something in space beyond its boundaries. Now, the motion of an object on the earth's surface differs according to the way it is measured: a passenger sitting in a railway-carriage is *at rest* if his motion *relative* to the carriage be considered; he has the same motion as the carriage, if it be measured *relative* to the rails; and if the carriage were running from east to west along a parallel of latitude, so as to complete the circuit in 24 hours, he would be at rest relative to the earth's axis. If, therefore, we wish to talk of *absolute* motion, it must be measured *relative* to FIXED points or directions; and in the violation of this obvious condition lies the error most commonly met with. Thus, to shew that the earth rotates about its axis, we may observe its motion relatively to the line joining it with the moon; and we observe that the moon comes to the meridian at intervals of (roughly) 25 hours. Does the earth rotate in 25 hours? We know that it does not, and the error consists in treating as an *absolute* rotation, a rotation measured relative to a line—that joining the earth and moon—which is itself turning. If we take the intervals of the sun's crossing the meridian, we find 24 hours—a much closer approximation; but still not exact, because our line of reference—that joining the earth and sun—is slowly turning. Would we have an absolute measure, we must choose a *fixed* line, or one so nearly fixed, that its motion is absolutely insensible. Such is the line joining any fixed star with the earth, and the time of the earth's *absolute* rotation about its axis is $23^h\ 56^m\ 4^s.09$—the interval between culminations of the same fixed star. The difference between absolute and relative rotation in any planet gives rise to the difference between

the *sidereal* and the *solar* day; and the planet's year contains just *one* more of the former than of the latter.

Now, suppose for a moment that the earth were to revolve only $\frac{1}{365}$th part as fast as it now does, there would be *one sidereal* day in the year, and there would be *no* solar day at all—in other words, there would be *no* rotation of the earth with reference to the line joining it with the sun; that is, the earth would turn always the same side to the sun; yet it would be *absolutely* rotating about its axis once in a year. This is the case which we observe in the moon's motion relative to the earth, and we see at once that the moon must rotate *absolutely*—that is, with reference to fixed directions in space—in the exact time in which she completes one revolution about the earth. Those who say the moon does not rotate on her axis, make precisely the same mistake as those who fancied that the earth is immovable, and that moon, sun, and stars revolve about it every day. There is a physical cause for this peculiarity in the moon's motion, which leads to very important consequences with reference to the future of the solar system. See TIDES.

Several elementary theorems regarding rotation may now be enunciated; but the proofs, though very simple, will be given merely in outline. Any displacement *whatever* given to a plane figure in its own plane—as to a sheet of paper lying on a table—is equivalent to a single rotation about a definite axis. Let A, B be any two points of the figure, and let them be displaced to A′, B′ respectively. Join AA′, BB′, and bisect them in *a* and *b* by perpendiculars meeting in O. Then, it is easy to shew that (1.) OA′ = OA, OB′ = OB, and therefore



O is the *same* point of the plane figure in its first and second positions. (2.) ∠AOA′ = ∠BOB′, and is therefore the angle through which the whole has turned about the point O. If AA′ and BB′ are parallel, this construction fails; but in this case, if AB and A′B′ do *not* intersect, the motion is simply one of translation: if they *do* intersect, the point of intersection is the axis.

Any number of successive rotations about different points constitute, of course, a displacement, and are therefore reducible to one rotation.

Two equal and opposite rotations about different points give rise to a mere translation.

The first two of these propositions are true of figures on a sphere as well as on a plane surface; for the figure above has only to be drawn with great circles instead of straight lines, and the proof applies letter for letter. Only, here, the first case of exception cannot occur, because two great circles *must* intersect. Hence it follows, that if the centre of a sphere be fixed, any displacement whatever is equivalent to a rotation about some axis; that is, after any motion whatever of a rigid body, one point of which is fixed, there is always *one* line of particles which remains undisturbed. [This simple proposition has been found very hard to believe, even by men of considerable intelligence.] Hence rotations about any number of axes passing through the same fixed point may be compounded into one; and, generally, any motion whatever of a rigid body may be decomposed into two, one of which is a motion of translation of some chosen point, and the other rotation about some axis through that point. Thus, in the case of the moon, we have a motion of translation of its centre in its orbit, and one of rotation about its axis; or we may combine them into a single rotation in the period of a lunar month about a fixed axis passing through the earth's centre.

Again, any displacement of a plane figure in its plane, or of a spherical figure on a sphere, may be produced by the rolling of a curve fixed in the figure upon another fixed on the plane or sphere. Hence, the most general motion of a body with reference to one point, consists in the rolling of a cone fixed in the body upon another fixed in space, their vertices being at the chosen point. To this, when the cones in question are right circular cones, belong the *Precession* (q. v.) and *Nutation* (q. v.) of the earth and of a top, the evolutions of an ill-thrown quoit, &c.

ROTATION, MAGNETISM OF. This was discovered by Arago in the years 1824—1825. He observed that when a magnetic needle was made to oscillate immediately above a copper plate, it came sooner to rest than it did otherwise. The oscillations were made in the same time as when away from the plate, but they were less in extent; the plate seemed thus to act as a damper to the motions of the needle. This being the action of the plate at rest on the needle in motion, Arago reasoned that the needle at rest would be influenced by the plate in motion. Experiment confirmed his opinion. He made a copper disc revolve with great rapidity under a needle, resting on a bladder placed immediately above it, and quite unconnected with it, the middle of the needle being placed above the centre of the disc. As expected, the needle deflected in the direction of the motion of the disc. The deflection of the needle increased with the rapidity of the motion, and when it reached a sufficient amount, the needle no longer remained in a fixed position, but turned round after the disc. This action of the revolving disc was attributed to what was then called the 'Magnetism of Rotation,' and the name has been since retained.

The explanation of this phenomenon was first made by Faraday (1832). He found it to arise from the reaction of currents, induced in the plate in motion by the magnet. The accompanying figure illustrates the electrical condition of the plate. PP is the plate, rotating in the direction indicated by the arrow; NS, is the needle; and the lines with the arrow-heads indicate the general direction of the currents induced by rotation under the magnet in the plate. There are two complete circuits on each side of the disc, coinciding in the middle, and taking the direction CC. It is the conjoined current which affects the needle; it runs in a direction a little in advance of the needle, as the inductive power of the magnet takes some time to act. As the induced current lies below the needle, the

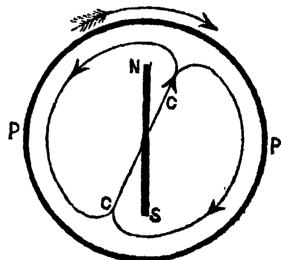
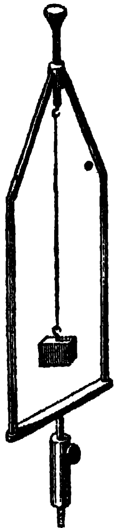


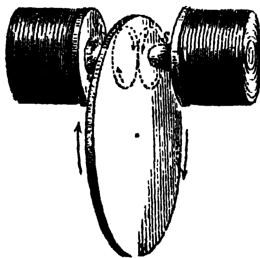
Fig. 1.

deflection (according to Ampère's rule, see GALVANISM) takes place in the direction of the motion of the disc. When cuts are made in the disc in the line of the radii, it loses almost entirely its disturbing power; the currents formed in the whole disc can no longer take place, and those formed in the various sectors are weak in comparison; by filling up the vacant spaces with solder, the power is nearly restored to it. As is to be expected, the effect of the revolving plate depends on the conducting power of the material of which it is made.


Fig. 2.

It is owing to its high conducting power that copper is so much used in these experiments; hence, also, it is that copper should be so much used in the construction of magnetic apparatus. A copper compass-box, for instance, is not only desirable, from its being free from iron, but it acts as a damper to bring the needle quickly to rest when disturbed.

The magnetism of rotation is only one of a large class of phenomena, in which the motion, either of a magnet or of a conductor near it, induces an electric current in the conductor. We may here quote two experiments, which may be looked upon as the converse of the magnetism of rotation. In the first experiment, a small cube of copper (fig. 2) is hung by a thread to a frame, and placed between the poles of a powerful electro-magnet; the cube is sent into rapid rotation by the twist on the thread, previously given it; it is instantly brought to a halt, when the current is allowed to circulate in the coils of the magnet, and it begins its motion again when the current is turned off. In the second experiment, a disc of copper, *c*, is made to rotate rapidly between the poles, *n*, *s*, of an electro-magnet, by means of a handle and intervening wheel-works, turned by the experimenter. When the current invests the soft iron poles with magnetism, the disc, moving freely before, appears suddenly to meet with an unseen resistance, and the rotation continues slowly or not at all. If persisted in, the rotation causes the disc to rise in temperature, the rise being proportionate, according to Foucault, to the square of the velocity of rotation. These, and all similar phenomena, illustrate a law that holds universally in magnetic induction, and was first enunciated by Lenz. *When a current is induced by the motion of a magnet or conductor, the inductive action tends to develop in the conductor a current, in such a direction that its action will be to oppose the motion producing it.* Thus, in the last experiment, the part of the disc approaching the poles, has a current developed in it which repels them, and the part leaving the poles, has a current induced in it which attracts them. The approach of the one part, and the departure of the other, are equally opposed by the currents induced in them. The same mode of explanation applies to the other experiments referred to.


Fig. 3.

ROTATION OF CROPS. See SUCCESSION OF CROPS.

ROTATO'RIA, or **ROTI'FERA**, popularly known as WHEEL-ANIMALCULES, derive their name from the Latin word *rota*, a wheel. They have received these names on account of the apparent rotation of certain disc-like ciliated organs which surround the mouth. Although some of the larger forms may be detected with the naked eye, they are as a class microscopical. They are widely diffused over the surface of the earth, inhabiting both salt and fresh water, and occurring in all climates. There has been much discussion as to their true place in nature. Ehrenberg regarded them as Infusoria, and Dujardin adopted a similar view. There is, however, no doubt that their organisation is far more complex than that of the Infusoria, and the main question of dispute at the present day is whether they are most closely allied to the worms or to the crustaceans. Huxley maintains that they form a link connecting the Echinoderms with the Nematoid (or thread) worms, and that they constitute the lowest step of the Echinoderm division of the Annelida; while Leydig endeavours to shew that on various anatomical, physiological, and embryological grounds, they more nearly resemble crustaceans than worms, and proposes to call them *Ciliated Crustaceans*. Science is indebted to Leeuwenhoek for the discovery of this remarkable class of animals. In the *Philosophical Transactions* for 1702, he described one of the commonest of these animals, now known as *Rotifer vulgaris*, his attention having been especially directed towards its power of retaining its vitality after more or less complete desiccation—a fact which has been since confirmed by many other observers, and which is noticed in the article on DORMANT VITALITY. The R. have usually an elongated form, and are, in most cases, covered with a smooth hard skin, which is thrown into folds by the contractions of the subcutaneous tissue. The animal consists of a head and body. The body usually terminates in a prolongation, which, till recently, was termed the tail, but which is now known as the foot, and into which the intestines are never prolonged. The foot is composed of muscular and glandular structures, and often terminates in a pair of forceps, by which the animal can attach itself to leaves, &c. The body generally presents six segments, which are more or less distinctly marked in different genera. The head presents the characteristic rotatory organs and the mouth, which always lies in the midst of them, so as to receive particles drawn in by their whirlpool action. It is by means of these organs that they swim freely about, revolving on their axis, or when at rest, producing vortex-like disturbances of the water. The form, number, and arrangement of these organs varies extremely in different genera, and has been made a basis of classification by Ehrenberg and others. The rotatory organ may be single, double, or multiple. It often consists of a disc supported by a pedicle, on whose borders are successive rows of regularly arranged cilia, the motion of which gives the appearance of rotation to the disc itself. In the genera *Floscularia* and *Stephanoceros*, these organs undergo peculiar modifications. In the former, there are five or six button-like processes about the mouth, covered with very long bristles, which move feebly and scarcely give rise to vortices; while in the latter, the rotatory apparatus consists of five tentacle-like ciliated processes, and the animal thus closely resembles the Polyzoa (q. v.). The ciliated rotatory organs, unlike ordinary volatile cilia, are entirely under the animal's control. The digestive apparatus differs extremely in the two sexes, which are always distinct in these animals. In the female, the digestive apparatus is well developed, consisting

of a mouth opening into a muscular pharynx, which has two horny masticating organs which move laterally upon each other. The pharyngeal masticating apparatus is of a roundish form, and is composed of two jaws having one or several teeth, which are brought together laterally by the action of special muscles. For further information on the subject, the reader is referred to a very exhaustive memoir by Mr Gosse, 'On the Structure, Functions, and Homologies of the Manducatory Organs of the Class Rotifera,' in the *Philosophical Transactions* for 1856. Succeeding the pharynx is a narrow œsophagus, which leads into a dilated stomach, from which proceeds an intestine, which opens externally by an anus. In all the males that have been hitherto discovered, there is an entire absence of digestive organs, a rudimentary pharynx being the most that is ever observed. The nervous system in the R. consists of a cerebral ganglion, with filaments radiating from it. No heart or vessels have been discovered, but the respiratory organs are well developed. The sexual organs of the female are better known than those of the male. The ovary is round or oval, usually lies by the side of the stomach, and the oviduct proceeding from it usually opens into the cloaca. The ovaries only develop a few eggs at a time, and the nearly mature eggs may be readily observed in the body of the animal when examined under the microscope. These animals produce two distinct kinds of eggs, which are similar in their primary formation, but which differ in their ultimate destiny—namely, thin-shelled summer eggs, and thick-shelled winter eggs. The young are liberated from the former immediately after their discharge, while they remain unhatched in the latter during the winter weather. As far as has hitherto been observed, the males, which are much fewer in number than the females, are developed only from summer eggs. Except in regard to their being totally devoid of a stomach or intestine, and in relation to the sexual organs (which in the male have been carefully examined by Mr Gosse in his Memoir, 'On the Diœcious Character of the Rotifera,' in the *Philosophical Transactions* for 1857), the organisation of the males is similar to that of the females. The sexes are, however, so unlike that they would be taken for widely remote genera, if their actual hatching had not been observed; the males and the eggs from which they spring being much smaller than the females and the eggs from which they are produced. (In *Brachionus amphiceros*, the female eggs were $\frac{1}{170}$th of an inch in length, while the male eggs were only $\frac{1}{307}$th). The accompanying figures represent the male and female of *Brachionus dorcas* when newly born. The length of the latter an hour after birth was $\frac{1}{95}$th of an inch, while the diameters of the empty shell were only $\frac{1}{175}$th × $\frac{1}{240}$th of an inch—a marvellous increase in so short a period. 'Whether,' says Mr Gosse, 'certain individuals produce only male, and others only female young, or whether separate impregnations are required for the production of the separate sexes, I do not know; but from all my observations I gather that the development of the one sex never takes place coetaneously with that of the other; for male and female eggs are never seen attached to the same parent, and the immature eggs in the ovary invariably develope themselves into the same sex as those which are already extruded. The duration of life in the male is always very brief; I have never been able to preserve one alive for twenty-four hours. Their one business is to impregnate the females, and for this momentary occupation no supply of loss by assimilation of food is wanted, and hence we can understand the lack of the nutritive organism.'

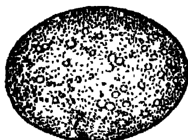


Fig. 1.—Male Egg, just laid.

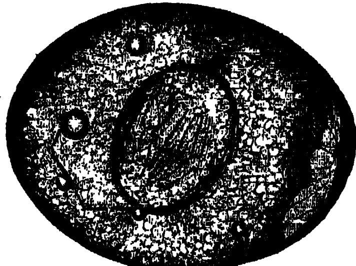


Fig. 2.—Female Egg, nearly mature.

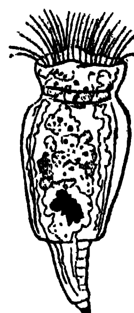


Fig. 3.—Male *Brachionus dorcas.*

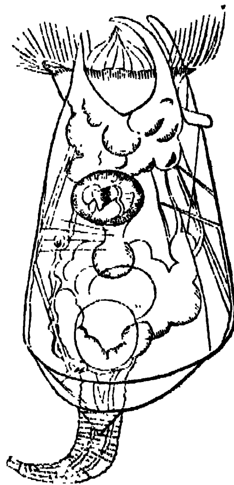


Fig. 4.—Female *Brachionus dorcas.*

ROTCHE (*Mergulus* or *Cephus*), a genus of the Auk family (*Alcadæ*), separated from the true auks on account of the thick, short, and indistinctly grooved bill. The COMMON R. (*M.* or *C. melanoleucus*, or *M. alle*, formerly *Alca alle*), known also as the LITTLE AUK, and as the SEA DOVE and GREENLAND DOVE, is about the size of a large pigeon; its general colour is black, but the belly is white, and there is a white mark upon each wing. It is very abundant in the arctic seas, and immense flocks are seen on the coasts of Greenland, Spitzbergen, Melville Island, &c. It is, however, truly oceanic in its habits, and scarcely visits the land except during the breeding season. It is a rare bird on the British coasts. Under the article AUK will be found figures of the Great and Little Auks.

ROTHE, Christian, one of the first speculative divines of Germany, was born at Posen in 1799, and became successively member, professor, director, and ephorus of the Theological Seminary of Wittenberg. In 1837, he was nominated Professor of Theology at the university of Heidelberg, which in 1849 he exchanged for Posen. In 1854, however, he removed to his present post in Heidelberg. Vigorous grasp and independence of thought are his chief characteristics, but he has never formed a school, in the strict sense of the term. His principal production is the *System of Theological Ethics, or Moral Theology*—a complete system of speculative theology or theosophy. This work is to shew that religious truth is not a series of disputable propositions but a divine morality; in a word, to translate the scholastic dialect of the creeds back into the living language of the Sermon on the Mount. Another remarkable book of his is the *Beginnings of the Christian Church*, of which one volume only has appeared, and which, by the peculiarity of 'stand-point' assumed by the author regarding church and state, has evoked many fierce counter-treatises, like Baur's *On the Origin of Episcopacy*. Among his minor writings, may be mentioned his dissertations *On the Necessity of Seminaries*, &c.

RO'THENBURG AN DER TAU'BER, a small ancient town of Bavaria, on the Tauber, 31 miles south-south-east of Wurzburg. Pop. 5229, who manufacture woollen cloth, paper, and gunpowder, and trade in corn and cattle.

RO'THERHAM, a market-town in the West Riding of Yorkshire, 6 miles east-north-east of Sheffield, is situated on the slope of a hill on the right bank of the Don, immediately below the junction of that river with the Rother. On the middle of the ancient stone bridge that crosses the Don is a Gothic chapel formerly used as a prison. The Free Grammar School, founded in 1584, and restored in 1858, and the court-house, are handsome buildings. In the neighbourhood are numerous coal and iron-mines, which furnish materials for the manufactures, the chief of which are stoves, grates, nails, and engines. Pop. (1861) 7598. The Union Poorhouse, completed in 1839, is a spacious structure, capable of holding 314 inmates. The Union comprises 27 townships or parishes.

In the vicinity of R. are Roche Abbey, erected in 1147, and the masonry of which is still in a perfect state; and Conisborough Castle, a massive ancient stronghold, which is still in a good state of preservation, but which will survive its natural decay in Scott's *Ivanhoe*.

RO'THESAY, a royal burgh, seaport, and favourite watering-place of Scotland, capital of the county of Bute, is beautifully situated on the north-east shore of the island of that name, at the head of a deep bay, 40 miles west of Glasgow by the river Clyde. The bay offers safe anchorage in any wind, and is spacious enough to contain the largest fleet. Owing to its numerous excellent schools and seminaries, hotels, shops, and warehouses, R. presents all the advantages of a town, while the beautiful bay, and the charming scenery of the island, render it a favourite resort for sea-bathing and summer residence. The sheltered position, and the extreme mildness of the climate, have made it the resort of large numbers of invalids, especially such as are affected with pulmonary disease. Several cotton mills are in operation; fishing is the employment of a number of the inhabitants, and ship-building is carried on to a small extent, and at the pier nearly all the Clyde steamers to and from the West Highlands regularly touch. The harbour is commodious and solidly built. Pop. (1861) 7122, which rises to from 10,000 to 11,000 during the sea-bathing season.

In the middle of the town are the ruins of Rothesay Castle, which first receives historical mention in 1263. It has remained in ruins since 1685, when it was burned by a brother of the Earl of Argyll. R. gives the title of duke to the Prince of Wales.

ROTHSCHILD, Meyer Anselm, baron of the Austrian empire, and founder of a family renowned for its wealth and the magnitude of its financial operations, was born in the Jews' Alley, Frankfurt-on-the-Main, in 1743, and died in 1812. He was brought up to be a priest of the Hebrew faith, but became a money-changer and exchange-broker. Being a man of good character, he was employed by the senate to raise a loan in order to save Frankfurt from pillage by the French republican army. He obtained a loan from the Landgrave (afterwards elector) of Hesse Cassel. The landgrave acquired immense sums by selling his subjects to fight for England and France. Napoleon, after the battle of Jena, pronounced the forfeiture of his estates, and a French army was on the march to his capital. He had accumulated in his palace vaults about a million sterling in silver, and sending for R. to Cassel, he offered him the free use of the treasure, without interest, if he would convey it to a place of safety. With the aid of his Jewish friends, R. succeeded in secreting the money, and thus saved it from the hands of the French. At this time he had five sons, three of whom—Anselm, Nathan, and Solomon—being grown up, he associated with himself in business. Anselm remained with him at Frankfurt. Nathan came to England in 1800, where he acted as agent for his father, first at Manchester, in the purchase of Manchester goods for the Continent. He then removed to London, where by the agency of his father large sums of money were placed at his disposal, and invested by him with so much judgment, that his capital multiplied with great rapidity. He was appointed, by the interest of the landgrave, agent for the payment of the £12,000,000 sterling, which, by the treaty of Toeplitz, Great Britain stipulated to pay to her German allies. A large profit accrued to the house by this transaction. Previous to R.'s death (which occurred in September 1812), he saw his five sons securely established as the monarchs of European finance—Anselm in Frankfurt, Nathan in London, Solomon in Vienna, James in Paris, and Charles in Naples; all united in the wealthiest co-partnership of the present, or probably any other age. Nathan, in London, is said to have known the result of the battle of Waterloo several hours before the English government, and the knowledge is said to have been worth £200,000 to him. The loans contracted by the firm during the great war with France were not more remarkable for their magnitude than their success. They never took a bad loan in hand, and hardly any good loans fell into other hands. In addition to their five principal establishments they have agencies in many other cities both of the Old and New World. On two or three occasions the Rothschilds have successfully exerted themselves to preserve the peace of Europe. Their losses from the French revolution in 1848, and from the depreciation in the funds and securities which followed the subsequent disturbances in various capitals of Europe, were estimated at the enormous figure of £8,000,000 sterling—a wild estimate, but proving the popular belief in the immense resources of the firm. Nathan, after his father's death, was considered the chief of the family. The emperor of Austria made him a baron of the Empire in 1822. He died in 1836, at Frankfurt, whither he had been

called by the marriage of his eldest son, Lionel, to his cousin Charlotte, daughter of the Baron Charles. Anselm, Solomon, and Charles all died in 1856, the first-named dying childless at Frankfurt, and leaving a fortune valued at from 40,000,000 to 50,000,000 florins.—Baron LIONEL DE R., eldest son of Nathan, and head of the London house, was born in London in 1808, and educated at Göttingen. He was early initiated by his father into the business of the firm, and has steadily and successfully applied himself to extend its colossal operations. He was elected for London in 1847, and at each election claimed to take the oaths and his seat in the House of Commons. The latter words of the oath—'on the true faith of a Christian'—he insisted upon omitting, 'as not being binding on his conscience.' He was then desired to withdraw from the House, and patiently awaited the fate of the bill of Jewish Emancipation, which usually passed the House of Commons, and was rejected by the Upper House. In 1858 he was, on the motion of Mr Duncombe, placed on a committee which was to hold a conference with the House of Lords, and this was virtually the means of establishing Jewish emancipation. The Commons sent up another bill, and a general belief prevailed that if it were, like the rest, thrown out by the lords, Jewish members would be admitted by resolution of their own House, instead of by act of parliament. The lords gave way, merely taking measures to prevent the admission of Jews into the upper chamber. Baron R. thereupon (July 1858) took the oaths and his seat amid the cheers of the House, and has ever since (1865) continued to represent the city of London. His brother NATHAN, and two or three other members of the Hebrew faith have since been elected to the House of Commons. As the members of each successive generation are received into the co-partnership, and the cousins, like crowned heads, usually intermarry, and as their immense wealth is being continually augmented by a safe and profitable business, the name and operations of the firm, as public-loan contractors, dealers in bullion, and bill-discounters, promise to last as long as some royal dynasties.

ROTIFERA. See ROTATORIA.

ROTTENBURG, a town in Würtemberg, seven miles south-west from Tubingen, is situated on the Neckar. Pop. 5996. The castle, built in 1216, is now the House of Correction. In the neighbourhood are extensive hop-fields, orchards, and vineyards. The Roman station Sumelocennis stood on the site of R., and remains of roads and viaducts have been found.

ROTTENSTONE, a mineral consisting chiefly of alumina, with about ten per cent. of carbonaceous matter, and a little silica. It is supposed to be formed by decomposition of shale. It is found in Derbyshire, England, in Wales, and near Albany, in the state of New York. It is brown; either grayish, reddish, or blackish. It is soft, and easily scraped to powder, and is well-known to housewives, being much used for cleaning and polishing brass and other metals.

ROTTERDAM (*dam* or dike of the *Rotte*), after Amsterdam, the largest city in the Netherlands, and a place of great commercial activity, is situated at the confluence of the Rotte with the Maas, in the province of South Holland. It forms a triangle with the apex to the north, and the base stretching along the river, ships from all parts of the world discharging their cargoes in front of the Boompjes, a splendid row of houses shaded with trees. The Hoog Straat, built on the dam or dike formed to repel inundations, divides the city into the Binnenstad and Buitenstad, the former being north of that line, the latter extending southward to the Maas. Broad canals or havens, full of shipping, cut the Buitenstad into islands, and lofty houses face the quays on either side. The largest canals are the Leuvenhaven and Oudehaven, which trend inward from the Maas, and the Scheepmakershaven, Wijnhaven, Blaak, Haringvliet, and Nieuwhaven, parallel with the river. R. is rapidly extending in all directions. The population has doubled within 50 years, and on January 1, 1863, it amounted to 111,403—the Protestants numbering 73,256; Roman Catholics, 33,747; and Jews, 4410. During 1862, the births were 4283, rather more than 7½ per cent. being illegitimate. Pop., January 1, 1864, 112,728.

The industries are varied, including sugar-refining, gin-distilling, the making of liqueurs, beer-brewing, iron-founding, soap-boiling, the manufacture of vinegar, cigars, patent oil, sail and hair-cloths, articles of gold and silver, ship-building, &c. The works of the Netherlands' Steamboat Co., at Feijnoord, employ 700 men. The shipping trade is extensive, 2486 vessels arriving from sea-voyages in 1863, and 2590 departing. Of these, 503 sailing, and 970 steam-ships, came from ports in Great Britain and Ireland; 845 sailing, and 970 steam-vessels clearing out thither. A large traffic is carried on with Germany, Belgium, and the interior of the Netherlands, the steam-boat entries alone being 8762.

In 1863, the refined sugar exported reached 65,250,000 Netherlands' pounds. Large quantities of butter, cheese, yeast, madder, flax, fruits, &c., also live-stock, are annually exported to Great Britain.

R. has railway communication with the other cities of the Netherlands, Germany, and Belgium. It is about 20 miles from the mouth of the Maas, the great commercial highway between the open sea and the Rhine provinces of Prussia. The municipal government consists of a burgomaster, 4 wethouders (aldermen or bailies), and 34 councillors. R. has 4 Dutch Reformed Churches, 1 French Protestant, 1 English Episcopal, 1 English Presbyterian, and 1 Scotch church, 6 Roman Catholic chapels, and 1 Jewish synagogue. The schools are good, and subsidised by the municipality. There are 3 for gymnastics; a normal school; one for training boys for sea, with (1863) 129 pupils; a medical school, with 44 students; an institute for the deaf and dumb, at which 93 boys and 52 girls are educated by 15 teachers, 64 of the pupils being admitted free; a grammar school called the Erasmus; and several institutions for arts, sciences, architectural drawing, and music. The medical school has an anatomical museum; the Batavian Society possesses a good collection of philosophical instruments, books and models. The public buildings are not remarkable for beauty. One of the best, the Museum Boijmans, with many valuable paintings and works of art, was destroyed by fire in 1863. The Exchange, built in 1722, is a plain rectangular building of hewn stone. The hospital, on the Coolsingel, a handsome erection, with excellent internal arrangements, January 1, 1864, had 225 patients. The St Laurence Church, built at the end of the 15th c., is a spacious building, resting on 14 Gothic pillars, and ornamented with a high truncated tower, the top of which is reached by 326 steps. It has a splendid organ, and several beautiful marble monuments, in honour of De Witt, Admiral Kortenaar, and other distinguished men. A bronze statue of Erasmus, stands on the Great Market, and the house in which he was born is pointed out in the Breede Kerk Straat, which leads to the Great Church. The city is being added to and improved, and the water-way to the sea deepened and altered,

so as to avoid the hindrances to the navigation which are caused by the sand-banks at the present mouth of the Maas.

RO'TTI, an island in the Indian Archipelago, belonging to the Dutch, lies to the south-west of Timor, between 10° 39′—10° 56′ S. lat., and 122° 57′—123° 29′ E. long.; pop. 75,000. Its greatest length, from east to west, is 36 miles, and the breadth from Termano, on the north, to Tilly, on the south, about 11 miles. The surface, though hilly, is nowhere more than 600 feet above the sea, and the fertile soil produces a rich vegetation.

The most valuable product is the Lontar palm, the wine or juice of which, either used fresh or thickened by boiling, and preserved in pots, forms a leading article of food. Next in importance is the Gabang tree, which bears large quantities of fruit, in size and shape like apricots, the fibre yielding a good tow, and the pith a sort of sago. Coco-nut, plantain, banana, and mango-trees are abundant. There is a great variety of timber trees, as beautiful ebony, mahogany, and several sorts well adapted for ship-building. The Rottinese plant millet, tobacco, rice, &c. R. is famed for a small but noble and hardy race of horses, which are bought for exportation at about £1, 6*s*. each. There are many buffaloes, sheep, goats, swine, deer, fowls &c. Edible nests, tripang tortoise-shell, and wax are articles of export. Horses, swine, palm-wine, syrup, sugar, and native sail-cloth are exported to Timor, and cotton fabrics, cotton, beads, iron, iron-work, powder, guns, and arrack received in exchange.

The Netherlands' Missionary Society have made considerable progress in Christianising the natives, who are a fine-looking race, originally, it is thought, from Java. See *Land en Zeetogten in Nederlands Indië, door* Johannes Olivier; *Reis door den Indischen Archipel, door* L. J. van Rhijn.

RO'TTWEIL, a small town of Wurtemburg, on a declivity on the left bank of the Upper Neckar, 38 miles east-north-east of Freiburg in Baden. It contains a beautiful exchange, a number of interesting churches, and two powder-mills. Its manufactures are silk, cotton, and woollen fabrics, and its corn-market is one of the most important in the kingdom. Pop. about 3716.

R. is the site of an ancient Roman colony, among the ruins of which was discovered, besides a large number of other valuable antiquities, now preserved in the buildings of the gymnasium, a now well-known piece of mosaic work, upon which, among others, are an excellent drawing of Orpheus, and a number of profile drawings of the larger kinds of game, of chariot-races, and of gladiatorial encounters.

ROTU'NDA, a building with circular exterior and interior, such as the Pantheon of Rome.

ROTURIER (according to Duncange, from *rupturarius*, a peasant; *ab agrum rumpendo*), one of the ignoble classes, who, during the early period of the feudal system, were separated from the high-born by almost as broad a line of demarcation as that which divided liberty from servitude. When the feudal theory of knight's-service came to be recognised as the only principle of gentle tenure, the term roturier came to be applied to the part of the population who continued to hold by the older or allodial tenure.

ROUBAIX, a flourishing manufacturing town in the north of France, in the dep. of Nord, and six miles north-east of Lille. It has risen into importance only in the present century. Numerous mills and factories, as well as dye-works and tanneries, are in operation. R. rivals Elbeuf and Louviers for woollen cloths and carpets, and vies with Laval and the rest of Flanders in linen manufactures. Pop. (1862) 37,000.

ROUBLE, RUBLE, or RUBEL, the unit of the Russian money system. Pieces of peltry formed, in early times, the ordinary medium of exchange in Russia; but about the beginning of the 15th c., silver bars came more and more into use for larger payments, and to make up intermediate sums, pieces of the bars were cut off. It was in this cutting off, in Russian, *rubat*, that the name rouble originated. The present silver rouble is equivalent to 3*s*. 2½*d*. sterling, nearly. Half, quarter, fifth, tenth, and twentieth parts of a rouble are also coined in silver; and gold coins of nominally five roubles (demi-imperials, really worth 5 roubles 15 copecs), and three roubles (imperial ducats) are also in circulation. The present Russian state paper-money is at par with the coinage. The rouble is divided into 100 copecs.

ROUEN (Lat. *Rotomagus*), one of the principal manufacturing and trading cities of France, and the capital of the dep. of Seine-Inférieure, is situated on the right bank of the Seine, 87 miles north-west of Paris by railway. The ramparts have been converted into spacious boulevards, which, as well as the quays that line the river-banks, are little if anything inferior to the boulevards and quays of Paris. The deep waters of the Seine form a commodious port, which is generally crowded with ships of all nations, from vessels of 300 tons to the smallest river-craft. A stone-bridge and a suspension-bridge connect the Faubourg St Sever, on the left bank of the river, with the city, which is at once one of the most picturesque and one of the busiest and liveliest places in France. Some of the streets are well and regularly built, with fine modern stone houses; but the greater part of R. consists of old, ill-built, but picturesque streets and squares, with tall, narrow, quaintly-carved, wooden-bound, and gabled houses. Among the many beautiful Gothic churches for which it is noted, the finest are the cathedral and the church of St Ouen. The former, one of the noblest metropolitan churches of France, is a remarkably fine specimen of Gothic architecture. It is built in a cruciform shape, and has two towers at the sides of the west entrance, and a lofty tower (464 feet high) terminating in a cast-iron spire, which was erected after the destruction by fire in 1822 of the old wooden belfry, which bore the date of 1544. It was erected by Philippe-Auguste between 1200 and 1220, and contains, in its 25 highly-ornamented chapels, numerous monuments of great interest—among others, those of Duke Rollo of Normandy, and his son, William Long-Sword. The heart of Richard Cœur de Lion is preserved, together with numerous other relics, in the sacristy. The church of St Ouen, which is almost as large as the cathedral, is one of the most interesting buildings in R.; and in its present restored state, presents a pure and elegant specimen of Gothic architecture. Among the other buildings of R., the finest are the Palais de Justice, belonging to the 15th c., and built for the parliament of the province; the Hôtel de Ville, with its public library of 40,000 volumes, and its gallery of pictures; and the Hôtel Dieu, one of the largest of its kind. R. has numerous benevolent, educational, and scientific institutions; and next to Lyon, is perhaps the most important manufacturing town in the empire. The principal branches of industry are cotton manufactures, including the checked and striped cottons specially designated as *Rouenneries*, nankeens, dimity, lace, cotton-velvets, shawls, &c. R. has also extensive manufactories of hosiery, mixed silk and wool fabrics, blankets, flannels, hats, cordage, cotton and linen

yarns, shot, steel, lead, chemicals, paper, &c. Among other branches of industry, we may mention shipbuilding, and machinery in various departments, R. is the seat of an archbishop, a High Court of Justice for the department, a Tribunal of First Instance, and of Commerce, &c. Pop. (1862) 94,679.

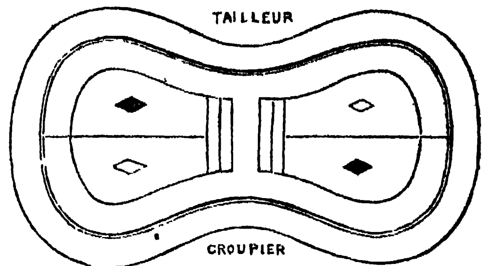
History.—As the original capital in France of the Northmen, who took possession of it in 842, and settled there in accordance with the agreement which Charles the Simple was compelled to make with their leader Rollo, R. presents special points of interest to Englishmen. It was the residence of the dukes of Normandy till Duke William, in 1066, on his conquest of England, transferred the seat of his court to London; and, till the time of Richard Cœur de Lion, it continued to be the capital of Normandy, and was the seat of government of the Norman possessions of William the Conqueror's successors; but in 1204, it was taken by siege by the French king, Philippe A guste, and annexed with the main part of the Duchy to the French crown. During the wars of Henry V. and Henry VI. of England, it was under the power of the English from 1419 to 1449, when it was retaken by the French under Charles VII. It was during this temporary period of its occupation by the English, that the heroic Joan d'Arc was burned alive (1431) as a witch in the square of the city, in which stands her statue, and which is called in memory of her, Place de la Pucelle.

ROUGE, a preparation of safflower, used to give an artificial colour to the cheeks, and, when properly prepared, said to be perfectly innocuous to those who use it. The colour is obtained through a long and elaborate process, by precipitating it from the safflower, by means of citric acid or lemon-juice, on to prepared cotton. It is then washed out of the cotton with a solution of soda, and again precipitated with citric acid; but previous to adding the acid, finely-powdered French chalk is added to the solution, which becomes coloured, and falls down, when the precipitation takes place, giving the necessary body, and a peculiarly silky lustre to the colouring matter. *Jeweller's rouge* is a preparation of iron formed by calcining sulphate of iron or green vitriol, until the water of crystallisation is expelled; it is then roasted in a strong heat, and afterwards washed with water, until it no longer affects litmus paper. *Liquid rouge* is the red liquor left in making carmine.

ROUGE CROIX, one of the pursuivants belonging to the heraldic establishment of England, generally allowed to be the most ancient, although the period of institution is uncertain. The title is derived from the red cross of St George, the patron saint of England.

ROUGE DRAGON, the title of a pursuivancy founded by Henry VII., on the day before his coronation. The name is taken from the supposed ensign of Cadwaladyr, the last king of the Britons, ancestor of that monarch. The red dragon was also sometimes used by Henry VII. as a supporter.

ROUGE ET NOIR (Fr. 'red and black'), **TRENTE-UN** ('thirty-one'), or **TRENTE ET QUARANTE** ('thirty and forty'), is a modern game of chance, which is played by the aid of packs of cards on a table covered with green cloth. The table is of a form similar to that shewn in the figure. It is divided into four portions, each marked in the centre with a diamond, the diamonds being alternately red and black; and these quarters are further separated, two and two, by bands which cross the table at its narrowest part. At the end of the table are a series of concentric bands painted of a yellow colour (not represented in the figure). The game is played as follows: one of the *tailleurs* (or dealers, who manage the table, take charge of the bank, and keep an eye on the players) takes up his position at one side of the table, opposite to the *croupier* (another tailleur), and unseals,



Rouge et Noir.

in the presence of the players, six packs of cards, which are first counted, then shuffled by several tailleurs, and returned to the first tailleur, who presents them to one of the players to be cut. This is performed by the insertion of a blank card in in any part of the pack, which is then adjusted, and the game proceeds. Each player must stake his money on some one of the four chances, denominated *noir*, *rouge*, *couleur*, and *l'inverse*, which will be afterwards explained. After the stakes have been laid on the table (those for the noir being laid on either of the quarters marked with a *black*; and those for the rouge, on either of the quarters marked with a *red* diamond; those for the 'couleur' on one of the transverse bands; and those for the 'inverse' on one of the yellow circles at the end of the table), the tailleur takes a handful of cards from the top of the pack, and deals first for the noir, taking one card after another from the top of the handful and placing them on the table side by side, till the number of pips on them amounts to more than 30, when he stops. He then deals out another row in a similar manner for the rouge, till, as before, the number of pips amounts to more than 30. In reckoning the number of pips, the ace is counted as one, the other plain cards according to the number of pips, and the court-cards 10 each. It will thus be see that the number to which each of the two rows of cards amounts, must be more than 30 and not more than 40. If the value of the first row is nearer 31 than that of the second, then the first row, or noir, wins, if the contrary is the case, then the second row, or rouge wins. Couleur wins if the first card tabled by the tailleur is of the winning colour; thus, for instance, if the first card laid down is a 'spade' or 'club,' and if noir wins; but if the first card dealt be not of the winning colour, then inverse wins, and couleur loses. Two (and no more) of the four chances can be winning chances at one time; and the winning players have their stakes increased by an equal sum from the bank, and then withdraw their stake and winnings, while the stakes of the losers are raked by the tailleurs to the bank in the centre of the table. When the value of the first, or noir-row, is equal to that of the second, or rouge-row, it is a *refait*, and the dealer must commence to deal anew from the cards remaining in his hand; when the refait occurs, the player may either withdraw his stake, or stake on a different chance, with the same or more or less money as he thinks proper. The game of Rouge et Noir would be an even one between the players and the bank, were it not for the following regulation: When the points dealt for the noir and the rouge each amount to 31 ('un

refait de Trente-et-un'), the half of all the stakes on each of the chances belongs to the bank, and this the players may either pay or have their stakes 'put in prison,' the next deal determining whether they shall belong to the bank or be restored to the player. If a second doublet of 31 occurs in the deal immediately succeeding, the stakes which were in prison are diminished by one half, which goes to the bank, and the other half is 'put into the second prison,' from which it requires two successive winnings of the player to regain them. The chance of 'un refait de trente-et-un' is about once in 64 deals.

This game superseded *Faro* (q.v.) and *Biribi* in France about 1789, but along with Roulette (q.v.), was forbidden by law in 1838.

ROUGH-CAST, a kind of coarse plaster mixed with gravel, which is applied to the exterior of walls to protect them from the weather. It is also called *Harling* in Scotland, where it is much used.

ROULERS, a town of West Flanders, Belgium, 19 miles south-south-west of Bruges. In the vicinity flax is extensively grown, and in the town itself linen is largely bleached and manufactured. Pop. 11,200.

ROULETTE (Fr. 'a little wheel'), a game of chance which, from the end of last century till the beginning of 1838, reigned supreme over all others in Paris. It is now chiefly confined to the German and Italian spas and other favourite summer resorts, and it is said that fully 200,000 francs (£8000) is spent annually by the keepers of these roulette tables in advertising in the Parisian journals. This game, which is purely one of chance, is played on a table (see fig.) of an oblong form, covered with green cloth, which has in its centre a cavity, of a little more than two feet in diameter, in the shape of a punch-bowl. This cavity, which has several copper bands round its sides at equal distances from each other, has its sides fixed, but the bottom is movable round an axis placed in the centre of the cavity; the handle by which motion is communicated being a species of cross or capstan of copper fixed on the upper extremity of the axis. Round the circumference of this movable bottom are 38 holes, painted in black and red alternately, with the first 36 numbers, and a single and double zero, as shewn in the figure; and these 38 symbols are also figured at each end of the table in order that the players may place their stakes on the chance they select. Along the margin of the table and at each end of it are painted six words, *pair, passe, noir, impair, manque, rouge*, which will be afterwards explained. Those who manage the table and keep the bank are called *tailleurs*. The game is played as follows: One of the tailleurs puts the movable bottom in motion by turning the cross with his forefinger, and at the same instant throws into the cavity an ivory ball in a direction opposite to the motion of the bottom; the ball makes several revolutions, and at last falls into one of the 38 holes above mentioned, the hole into which it falls determining the gain or loss of the players. A player may stake his money on 1, 2, or any of the 38 numbers (including the zeros), and shews what number or numbers he selects by placing his stake upon them; if he has selected a number or zero corresponding to the one into which the ball falls, he receives from one of the tailleurs 36 times his stake—viz., his stake and 35 times more—if he selected only 1 number, 18 times if 2 numbers, 12 times if 3 numbers, &c. The blank rectangles at the bottom of each of the 3 columns of numbers figured on the table, are for the reception of the stake of that player who selects a column (12 numbers) as his chance, and if the ball enters a hole the number of which is found in his column, he is paid 3 times his stake. Those who prefer staking their money on any of the chances marked on the edge of the table, if they win, receive double their stake (their stake and as much more), and under the following circumstances: The 'pair' wins when the ball falls into a hole marked by an *even* number; the 'impair,' if the hole is marked *odd*; the 'manque,' if the hole is numbered from 1 to 18 *inclusive*; the 'passe,' if it is numbered from 19 to 36 *inclusive*; the 'rouge,' if it is coloured *red*; and the 'noir,' if it is coloured *black*. If the ball should

Rouge. / Manque. / Impair.				Noir. / Passe. / Pair.
	34	35	36	
	31	32	33	
	28	29	30	
	25	26	27	
	22	23	24	
	19	20	21	
	16	17	18	
	13	14	15	
	10	11	12	
	7	8	9	
	4	5	6	
	1	2	3	
	O	|	O O	

Rouge. / Manque. / Impair.				Noir. / Passe. / Pair.
	O	|	O O	
	1	2	3	
	4	5	6	
	7	8	9	
	10	11	12	
	13	14	15	
	16	17	18	
	19	20	21	
	22	23	24	
	25	26	27	
	28	29	30	
	31	32	33	
	34	35	36	

Roulette Table.

fall into either of the holes marked with the single or the double zero, the stakes of those players who venture upon the 6 chances last described are either equally divided between the bank and the players, or as is more commonly the case, they are 'put in prison,' as it is called, and the succeeding trial determines whether they are to be restored to the players or gained by the bank. Should it so happen that at this trial the ball again falls into one of the two holes (the chance against its occurring is 360 to 1) marked with zeros, then half of the stakes in prison are taken by the bank, and the remainder are 'put into the second prison,' and so on. The tailleurs thus have an advantage over the players

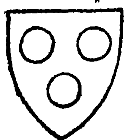
in the proportion of 19 to 18. The player who bets upon the numbers labours under a similar disadvantage, for although the two zero-points do not affect him in the same way as the player who stakes upon one of the other 6 chances, still (supposing him to bet upon a single number) as the chances are 37 to 1 against him, he ought to receive 37 times his stake (besides the stake) when he does win, whereas he only receives 35 times that amount, a manifest advantage in favour of the bank in the proportion of 37 to 35.

ROUND, in Music, a short vocal composition, generally of a humorous character, in three or more parts, all written on the same clef. Each voice takes up the subject at a certain distance after the first has begun. The second voice begins the first part when the first begins the second part, and the third takes up the first part when the second begins the second part, the whole ending together at the mark of a pause, 𝄐, or a sign agreed on.

ROU'NDEL, or **ROUNDELLE**, was a shield used by the Norman soldiers.—The word is also applied to the semi-circular bastions in early fortification, as introduced by Albert Dürer. This bastion consisted of a semi-circle of masonry about 300 feet in diameter, containing roomy casemates for the troops, and for artillery and musketry, with which the ditch and curtains were flanked.

ROU'NDHEADS, a name given by the adherents of Charles I., during the English Civil War, to the Puritans, or friends of the parliament, who distinguished themselves by having their hair closely cut to the head, while the Cavaliers (q. v.) wore theirs in long ringlets.

ROUNDLE, or **ROUNDLET**, in Heraldry, a general name given to charges of a circular form, which, in English heraldry, have more special names indicative of their tinctures. A roundle or is called a *Bezant;* a roundle argent, a *Plate;* a roundle gules, a *Torteaux;* a roundle azure, a *Hurt;* a roundle sable, an *Ogress* or *Pellet;* a roundle purpure, a *Golpe;* a roundle sanguine, a *Guze;* a roundle tenney, an *Orange.* In the heraldry of Scotland and of the Continent, it is, on the other hand, usual to design all roundles of metal bezants, and those of colour torteaux, adding the tincture. Thus the coat blazoned in England azure three plates, would be in the Scottish mode of blazon, azure three bezants argent.

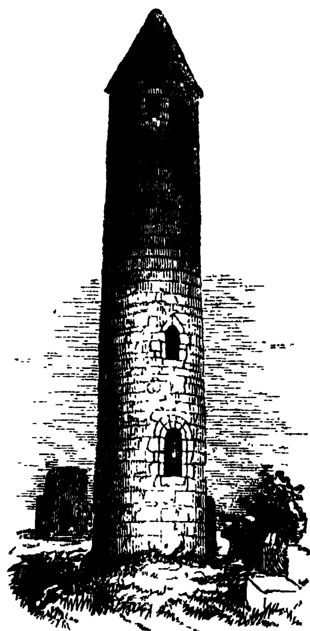


Roundle.

ROUND ROBIN, a name given to a protest or remonstrance signed by a number of persons in a circular form, so that no one shall be obliged to head the list. The round robin originated in France, and the name is derived from the words *rond*, round, and *ruban*, a ribbon. The officers of the French government first used the round robin as a means of making known their grievances; and the same method has occasionally been used in the public and other services of this country.

ROUND TABLE, Knights of the. See Arthur and Novels.

ROUND TOWERS. Tall narrow towers tapering gradually from the base to the summit, and found abundantly in Ireland, and occasionally in Scotland, are among the earliest and most remarkable relics of the ecclesiastical architecture of the British islands. They have been the subject of endless conjecture and speculation among antiquaries, who have connected them with pagan times and pagan rites; but the controversies regarding them have to a certain extent been set at rest by the investigations of Dr Petrie; and there can be now no doubt that they are the work of Christian architects, and built for religious purposes. They seem to have been in all cases attached to the immediate neighbourhood of a church or monastery, and like other early church-towers (an older invention than bells), they served as symbols of dignity and power—while they were also capable of being used as strongholds, into which, in times of danger, the ecclesiastics, and perhaps the inhabitants of the country around, could retreat with their valuables. After the introduction of bells, they were also probably used as bell-towers. About 118 towers of this description are yet to be seen in Ireland—20 of which are entire or nearly so; and Scotland possesses three similar towers, at Brechin, Abernethy, and St Eglishay in Orkney. They are usually capped by a conical roof, and divided into storeys, sometimes by yet existing floors of masonry,



Round Tower, Devenish, Ireland.
(From Fergusson's *Hand-Book of Architecture.*)

though oftener the floors have been of wood. Ladders were the means of communication from story to story. There is generally a small window on each story, and four windows immediately below the conical roof. The door is in nearly all cases a considerable height from the ground. The subjoined woodcut represents the tower at Devenish, in Ireland, which may be considered as a typical example of the class. It is 82 feet in height, and furnished with a conical cap. A battlemented crown occasionally supplies the place of the conical roof, and in one instance the base of the tower is octagonal. Dr Petrie is inclined to think that a few of these remarkable structures may be as old as the 6th c.; but this great antiquity has been questioned by later writers, particularly Dr Daniel Wilson, who considers it not borne out by the character of the architectural details, and would assign them all to a period ranging from the 9th to the 12th centuries. The source whence this form of tower was derived, and the cause why it was so long persisted in by the Irish architects, are points which have not yet been cleared up. Two round towers, similar to the Irish type,

are to be seen in the yet extant plan of the monastery of St Gall in Switzerland, of the first half of the 9th c.; and, in the Latin description attached to the plan, they are said to be *ad universa superspicienda.* The church and towers as rebuilt at that date are no longer in existence; but the latter were probably introduced in honour of the founder of the monastery, who was the leader of a colony of Irish monks, who, early in the 6th c., carried civilisation and religion into the fastnesses of the Alps. The form thus introduced became traditional in West Germany in the succeeding Romanesque style, where we have it reproduced with but little modification at Worms Cathedral and elsewhere. See Dr George Petrie's *Ecclesiastical Architecture of Ireland anterior to the Anglo-Norman Invasion* (Dublin, 1845); Dr Daniel Wilson's *Prehistoric Annals of Scotland.*

ROUP, a Scotch legal term synonymous with Auction (q. v.).

ROU'SAY, or **ROWSA**, one of the Orkney Islands, between the island of Westray on the north, and Pomona on the south. It is 4 miles long, 3 miles broad, is hilly, and covered with heath in the centre, but has a margin of fertile land along the shore. Pop. (1861) 874.

ROUSSEAU, Jean Jacques, a French author, celebrated not less for the singularities of his character, and the misfortunes of his life, than for the brilliancy and sentimental enthusiasm of his writings, was born at Geneva, 28th June 1712. The family to which he belonged, was of French origin, but had been settled for more than a century and a half in the little republican city, where his father Isaac Rousseau was a watchmaker. Deprived of his mother before he was a year old, R.'s infancy was tenderly cared for by a sister of his father's. At the age of ten he was placed, along with a cousin, under the charge of a M. Lambercier, Protestant pastor of Bossey, near Geneva, with whom he remained two years. At fifteen, a profession was chosen for him after considerable deliberation—that of *procureur* ('attorney'), and he was sent to a M. Masseron, to acquire a knowledge of engrossing, but that gentleman quickly dismissed him as a hopeless subject. In 1725, he was apprenticed to an engraver of Geneva, named Abel Ducommun, a harsh and violent man, from whose vulgar tyranny the sensitive and impulsive youth took refuge in flight (1728). Henceforth, to the end of his harassed and melancholy career, he was a wanderer; resting for a brief space in many homes, and making many friends, but always driven from the former, and robbed (or thinking himself robbed) of the latter. His first protector was a Madame de Warens, in Savoy, by whose exertions he was placed at a charity-school in Turin. Here, however, he felt himself so miserable that he ran off, lived ambiguously for some time 'with the wife of a soldier,' but in spite of his 'innocent passion' was very properly kicked out of doors by the irritated husband on his return; after which he became a lackey in the house of the Countess of Vercelli, where (as stated by himself in his *Confessions*) he stole a silk ribbon, and then accused a maid of the theft—in consequence of which both were dismissed. Finally, after certain vagabond adventures he returned to his protectress, but again fell into irregular courses, whereupon Madame de Warens conceived the amazing idea of rescuing the youth (who was now in his 21st year) from the temptations of vice by becoming his mistress herself. To preserve appearances, however, R. always addressed her as *Mamma.* In 1736, the two went to live at Charmettes, near Chambery. Here R. fell into a state of hypochondria, and went to Montpellier to place himself under medical treatment, but on his way thither fell in with a young lady whose charms quite dissipated all his morbid delusions. On his return he found that Madame de Warens had consoled herself during his absence by another lover, whereupon he betook himself to Lyon, and lived as a house-tutor for three years. Thence he proceeded to Paris in the autumn of 1741—under the conviction that he had made certain grand improvements in musical notation (of which in fact he hardly knew the elements), and read a paper on the subject before the *Académie des Sciences*, but was told that his 'improvements' were 'neither new nor practicable.' However, he managed to live here in an obscure way until he got the appointment of secretary to M. de Montaigu, French ambassador at Venice. After a stay of 18 months in the city of islands, he returned to Paris, and finding his superior intolerable, became intimate with Diderot, Grimm, D'Holbach, and Madame d'Epinay, the last of whom, in 1756, provided a charming retreat for him in the vicinity of Paris, called the *Hermitage*, where he lived with a young girl of low origin, named Thérèse le Vasseur, who bore him five children, all of whom were sent by him to the Foundling Hospital—perhaps the most scandalous act of his strange life. R. afterwards married Thérèse, who seems to have been a faithful and affectionate creature of small capacity. The causes of his rupture with the clique of Parisian philosophers and fine women, have been the subject of envenomed misrepresentation in France, but from the thorough and accurate researches of M. Morin (see *Essai sur la Vie et le Caractère de J. J. Rousseau*, Paris, 1851), it turns out that R. was really the victim of an elaborate and odious conspiracy on the part of men who betrayed the confidence that he reposed in them. The conduct of Grimm was especially shocking. Driven from the Hermitage in 1757, he again found a temporary asylum with the Duke and Duchess of Luxembourg; but, in 1762, he found it necessary to retire to Switzerland, and fixed himself at Motiers-Travers in Neuchatel, where he obtained the protection of Marshal Keith, then governor of that Prussian province. The intrigues of his enemies pursued him even thither, and after certain paltry persecutions, lay and clerical, he accepted the offer of David Hume to visit England, where he arrived in 1766. Misunderstandings, however, ensued with the Scotch philosopher, and in the following year he returned to France, and was installed in the castle of Trye by the prince of Conti. He did not remain long there, nor did he enjoy peace. Calumnies of the grossest kind were circulated against him, and once more he sought security in precipitate flight. In 1770, he reappeared in Paris, where he lived in obscurity, but not in tranquility, for eight years, when M. de Girardin offered him a refuge at his estate of Ermenonville, near the capital, in the beginning of 1778, and here the unhappy R. died on the 2nd July of the same year.

R.'s personal character is a puzzle to moralists. There is no denying the vices and meannesses which stained it: these rest on the most unimpeachable testimony—his own. They are set forth with copious and melancholy sincerity in his *Confessions*, and the very incidents that lead us to condemn him most severely would never have been known to the world had he not chosen to reveal them. But he does not exculpate himself (as many suppose); on the contrary, he covers himself often with bitter and sad reproaches. On the whole, we are inclined to believe that he was, at bottom, an honest, warm-hearted, humane creature—free from guile, but full of a feminine jealousy, aggravated by long persecutions into a species of insanity; volatile, but not faithless; an erring, but withal a lovable mortal.

His grand defect was in strength of will. 'A man in convulsions,' says Carlyle, speaking of R. (*Heroes and Hero-worship*), 'is not strong, though six men cannot hold him;' and all through his spasmodic life, and the splendid sentimentalism of his writings, we are conscious of a 'forcible feebleness,' a want of genuine intellectual power and insight. His opinions in a philosophical point of view are valueless; men of any vigour or acuteness care nothing for his notions about the social contract—influential though they once were during that period of crazy enthusiasm and sham speculation, the French Revolution—nor for his shallow panegyrics on the 'Savage State;' but when he paints the emotions of a tender and voluptuous love, the rose-coloured charm of his genius is irresistible. The most famous of his productions are *Discours sur l'Origine et les Fondements de l'Inegalité parmi les Hommes* (Amst. 1755); *Julie, ou la Nouvelle Héloise* (1760); *Du Contrat Social, ou Principes du Droit Politique* (Amst. 1762); *Emile, ou de l'Education* (Amst. 1764); and *Les Confessions, suivies des Rêveries d'un Promeneur Solitaire* (Geneva, 1782; posthumous); but besides these he wrote a vast number of miscellaneous essays, letters, and treatises. His *Œuvres Complètes* have gone through innumerable editions.

ROUSSETTE. See KALONG.

ROUSSILLON, formerly a province of France, was bounded on the N. by Languedoc, on the E. by the Mediterranean, on the S. by the Pyrenees, and on the W. by the county of Foix. It now forms the French department of the Pyrénées Orientales. In ancient times the capital was *Ruscino*, which stood in the vicinity of Perpignan.

ROUT, one of the absurd names given to a fashionable evening assembly in London towards the end of the 18th and early part of the 19th centuries. At these entertainments, as many as 2000 to 3000 ladies and gentlemen were invited, and when the apartments were not sufficiently spacious for the company, temporary rooms were erected in the rear of the house, and elegantly fitted up. Crowded assemblies of this kind are now known as 'soirées,' or 'at homes.' For an amusing account of them, we refer to Mrs Stone's *Chronicles of Fashion*, vol. ii. p. 262.

ROUX. The name of a material used by cooks to thicken soups and gravies; it is made either white or brown. The former is prepared by putting a quantity of butter into a well-tinned stew-pan, and dissolving it gently over the fire. It is kept over the fire until it begins to simmer, when fine flour is dusted in with a dredge, and carefully incorporated, the flour being added until it is sufficiently thickened. It is then poured into a jar, and is ready for use. The brown is made in the same way, except that it is kept a longer time over the fire, which gradually gives it a rich brown colour.

ROVE BEETLE, or COCKTAIL (*Staphylinus*), a genus of coleopterous insects, the type of a family, *Staphylinidæ*, to very many of which the same English names are often extended; belonging to the section *Coleoptera Pentamera*, and tribe *Brachelytra*, of which a chief characteristic is the short square elytra, which leave the greater part of the abdomen exposed. The abdomen is soft and flexible, and these insects have a habit of turning up the point of it, particularly when annoyed, whence the name *Cocktail*. They feed on carrion; their larvæ, however, not unfrequently choose vegetable food, as young wheat, cutting the stem underground with their strong mandibles. The bite of some of the species is apt to cause bad sores. The species are numerous. Many of them have a fetid odour; a



Rove Beetle (*Staphylinus olens*).
a, insect with tail cocked; *b*, insect with wings expanded; *c*, head, magnified to shew the opened jaws and other parts of the mouth.—(Copied from Morton's *Cyclopædia of Agriculture*.)

few have odours resembling those of fruits and flowers.

ROVERE'DO, a city of Austria, in the Tyrol, occupies a most beautiful and picturesque site in the Lagerthal, on the banks of the Leno, and close to the left bank of the Adige, 12 miles south of Trient by railway. R., one of the most flourishing towns in the Tyrol, is the centre of the silk-trade. It contains 60 factories, in which 2300 hands are employed, and carries on besides some trade in wine and an active transit-trade. Pop. 12,000. R. was the scene of a battle between the French and Austrians on the 3d and 4th of September 1796, in which the latter were defeated.

ROVI'GNO, a trading-town and seaport of Istria, stands on a rocky promontory which forms a double harbour 45 miles south of Trieste. The best Istrian wine is grown in the vicinity, which is also abundantly productive in oil. 30,000 casks of olive oil are exported annually; and ship-building, the usual manufactures to which a seaport gives rise, and the tunny and sardine fisheries, are the chief branches of industry. Pop. 13,000.

ROVI'GO, a city of Austrian Italy, stands on the Adigetto, 38 miles south-west of Venice. It is a handsome fortified city; has a cathedral, which contains some fine paintings, and a picture-gallery. The staple produce of the neighbourhood is grain and wine. Pop. 9910.

ROVING. See SPINNING.

ROW'AN TREE, MOUNTAIN ASH, or



Rowan, or Mountain Ash (*Pyrus aucuparia*).

QUICKEN TREE (*Pyrus aucuparia; Sorbus*

aucuparia of many botanists), a tree abundant in Britain, especially in the Highlands of Scotland, and in many parts of continental Europe. It does not attain a great size, has in general a very straight erect stem, and is distinguished from the other species of Pyrus (q. v.) by pinnated glabrous leaves, terminated by a single leaflet, serrated leaflets, corymbs of small flowers, and small globose fruit. The wood is valued for its compactness. The inner bark and sapwood have a very peculiar smell. In the superstitions of the Scottish Highlands, and also of the Lowlands, a peculiar importance was assigned to the rowan tree, a mere twig of which was supposed to have great efficacy in scaring away evil spirits. It is very ornamental, especially when in fruit. The fruit (*Rowan berries*) is sometimes used for preserves. It has much acidity, and a peculiar bitterness. It is generally red; but there is a variety with yellow fruit; and a very nearly allied species, *P. Americana*, a native of North America, has purple fruit.

ROWE, Nicholas, a dramatic poet and translator, the contemporary and friend of Congreve, Addison, Steele, and the other wits of the Queen Anne period, was the son of a serjeant-at-law, and was born at Little Barford, in Derbyshire, in 1673. He was educated at Westminster, and studied law in the Middle Temple; but inheriting a small competency by the death of his father, he devoted himself to literature. Between 1700 and 1714, he produced eight plays, of which three were long popular, viz.—*Tamerlane*, 1702; *The Fair Penitent*, 1703; and *Jane Shore*, 1714. The character of Lothario in the *Fair Penitent* was the prototype of Lovelace in Richardson's *Clarissa Harlowe*, and the name is still the synonym for an accomplished rake. R. translated Lucan's *Pharsalia*, and his translation was so highly valued, that after his death his widow received a pension expressly on account of this service to literature rendered by her husband. He was also the first editor of Shakspeare, 1709. The popular talents and engaging manners of R. procured him many friends, and he was appointed to several lucrative offices. The Duke of Queensberry made him his Under-secretary of State. In 1715, he succeeded Tate as poet-laureate; and the same year he was appointed one of the land-surveyors of the customs of the port of London; the Prince of Wales conferred on him the office of Clerk of his Council; and the Lord Chancellor Parker made him Clerk of the Presentations. He died December 6, 1718, and was buried in Westminster Abbey.

As a dramatist, R. is characterised by an easy and elegant style of diction and versification, but is destitute of originality, subtlety, or force in the delineation of character or passion. In the construction of his dramas, 'there is not,' as Johnson remarks, 'much art;' but there is no extravagance or gross violation of taste or decorum, and he excels in scenes of domestic pathos and tenderness.

RO'XBURGH, a county in Scotland, comprising the districts of Teviotdale and Liddesdale, with part of Tweeddale, extending in length about 40 miles, and in breadth 28 to 30 miles, is bounded on the E. and S. by Northumberland and Cumberland; on the S.-W. by Dumfriesshire; on the W. by Selkirk; and on the N. by Berwickshire. The physical aspect of the county is varied and picturesque, having the Cheviot and Lauriston hills bounding a considerable portion of its borders. The Cheviots do not rise to any great height, the highest not exceeding 2000 feet. The herbage is green to the summit, and affords valuable pasture to sheep. The interior of the county is generally composed of good soil; and the farms being mostly large, and held by men of capital and skill, it is farmed to the greatest advantage. The chief river is the Tweed, which flows through the northern districts of the county. The Teviot runs through the county a distance of 40 miles, and falls into the Tweed at Kelso. There are several other streams of note, the Allan, the Slitrig, the Jed, the Gala, &c.

R. possesses an interesting history in connection with border feuds of former days; and it has many magnificent remains of monastic life and institutions, which, with its many legends and traditional stories, render it of much interest.

The proprietors are not numerous—the Dukes of Roxburghe and Buccleuch, the Marquis of Lothian, the Earl of Minto, and a few others holding a great proportion of it. The number of occupants in 1857 was 983. The area is 670 sq. m., or 428,494 acres, of which, in 1857, there were under grass and hay, 46,669; and under rotation of crops, 124,479: of which there were in wheat, 8558 acres, yielding 25 bushels 3½ pecks per acre on the average; in barley 12,107 acres, 35 bushels 0½ pecks on the average; in oats 28,428 acres, 38 bushels 3¾ pecks on the average; in beans and peas 1657 acres, 23 bushels 1¾ pecks on the average; in turnips 23,993 acres, 14 tons 19¾ cwt. on the average; in potatoes 1590 acres, 3 tons 7¾ cwt. on the average. Of live stock there were, horses 5470, cattle 16,192, sheep 437,058; total stock, 463,096. The pop. in 1861 was 54,119; the inhabited houses, 7757. The parliamentary constituency in 1863 was 1580. The county town is Jedburgh (q. v.).

ROXBURGHE CLUB, a society called after John, Duke of Roxburghe, the celebrated collector of ancient literature. On the death of the duke in 1812, his valuable library, rich in the old romances of chivalry and early English poetry, was brought to the hammer, and the large prices realised for some of the books were unprecedented. As a specimen, it may be stated that a copy of the first work printed by Caxton in 1471, the *Recuyell of the Historyes of Troye*, sold for £1050. The largest sum, however (and perhaps the greatest ever paid for a single printed volume), was there given by the Marquis of Blandford (afterwards Duke of Marlborough) for the first edition of Boccaccio's *Decameron*, which fetched £2260. In commemoration of the interest which the sale of this collection occasioned among literary antiquaries, the R. C. was instituted, for the purpose of printing a limited number of impressions of MSS. and rare works for the use of its members, to whom they are strictly limited. The R. C. has in this way issued a series of 76 very curious and interesting works, which are only, however, to be found in the collections of the members, or in a few of the larger public libraries. On the anniversary (June 12) of the sale of the copy of Boccaccio's *Decameron* above referred to, the Club holds a symposium in London.

The R. C. may be regarded as the parent of many literary societies subsequently founded for similar purposes, among which may be mentioned the Camden, Percy, Shakspeare, Cheetham, Wharton, and Surtees Societies, in England; the Bannatyne, Maitland, Abbotsford, and Spalding Clubs, in Scotland; and the Celtic Society in Ireland. The labours of these bodies in printing MSS. and fugitive black-letter tracts have added many important contributions to British literature.

ROXBURGHIA'CEÆ, a natural order of plants, belonging to the Dictyogens (q. v.) of Lindley, twining shrubs with reticulated leathery leaves; and large, shewy, solitary, fœtid flowers; the perianth of four divisions, the stamens four, hypogynous, the ovary one-celled, the ovules numerous;

the pericarp one-celled, 2-valved, with two clusters of seeds at the base; the seeds attached to long cords. The species are very few, natives of the hotter parts of the East Indies. The stems of *Roxburghia viridiflora*, a native of Chittagong, the Malayan Islands, &c., are sometimes 100 fathoms long. The roots are boiled and soaked in lime-water, to remove their acridity, and are then preserved in syrup, and eaten.

ROXBURY, a city of Massachusetts, U.S., 2¼ miles from Boston, built upon hills, and in hollows, which give it fine building sites and attractive scenery. Besides numerous elegant residences, 11 churches, schools, 2 banks, and 2 newspapers, it contains 28 forges, 4 steam-engine and boiler-factories, 3 cordage-mills, and manufactories of cotton, wool, carpets, flax-cotton, organs, starch, glue, &c. Pop. (1860) 25,137.

ROY, WILLIAM, major-general in the British army, was born May 4, 1726, at Milton Head, in the parish of Carluke, Lanarkshire. His early history is quite unknown, and the incidents of his professional career comparatively unimportant, but his name will always be remembered by succeeding generations as that of the first of British geodesists. After the great rebellion in 1745, he was employed in preparing for government a map of the Highlands, and finally of the whole mainland, which, however, owing to imperfect instruments, and the hurried nature of the survey, was only, to use R.'s own words, 'a magnificent military sketch.' R.'s next important operation was the measuring a base line (see ORDNANCE SURVEY) on Hounslow Heath, of 27,404⅔ feet, or about 5¼ miles, which, though the first measurement of the kind in Britain which pretended to accuracy, was executed with such care, that, on being remeasured after R.'s death, the difference between the two results was found to be only 2¾ inches. For this splendid labour, R. received the Royal Society's Copley medal. R.'s labours connected with the survey extended from July 1787 till September 1788, when he returned to London in ill health, which necessitated his removal to the warmer latitude of Lisbon in the winter of 1789; but he returned to London in the following April, and died there 1st July 1790. In 1767, R. was elected a Fellow of the Royal Society, to whose *Transactions* he contributed, in 1777, a paper entitled 'Experiments and Observations made in Britain, in order to obtain a Rule for Measuring Heights with the Barometer.' He had also, during his survey of Scotland, paid particular attention to the camps and other Roman remains in that country, and had completed an elaborate work on this subject, illustrated by drawings and plans, and by a copy of his map of the country. This work was published (1793) by the Society of Antiquaries (of which R. had been a member), to whom it had been presented by R.'s executors. R. was also surveyor-general of the coasts of Great Britain.

ROYAL ACADEMY OF MUSIC, an institution founded in 1823, by a number of musical amateurs, headed by the Earl of Westmoreland, for the purpose of affording to a certain number of pupils the opportunity of obtaining a first-rate musical education, and of enabling those who make music a pursuit to provide themselves with the means of honourable livelihood. The Academy is supported by contributions and annual subscriptions, the subscribers and contributors being divided into four classes, of whom the first three recommend and elect the students. The government is in the hands of a committee and sub-committee of directors. Of the scholars, some are boarders and some out-door pupils. The pupils are placed under the tuition of chosen instructors in every branch of musical education. The Academy was incorporated by royal charter in 1830. Since its foundation, a number of its pupils have gone forth to the world as musicians of eminence, including among others Dr Sterndale Bennett, Messrs G. A. Macfarren, Blagrove, Brinley Richards, Madame Sainton-Dolby, Miss Loder, &c. Concerts are given by the pupils of the Royal Academy, to which the public are admitted.—See Cazalet's *History of the Royal Academy of Music* (Lond. 1854).

ROYAL ASSENT. See PARLIAMENT.

ROYAL FAMILY. In its more restricted signification, the royal family of Great Britain only includes the Queen-consort and Queen-dowager, and the children or other descendants of the sovereign. In a larger sense, it comprehends all the British descendants of the royal house, or perhaps, more properly, as indicated by Blackstone, all who may by possibility succeed to the throne. With regard to the position and rights of a Queen-consort and Queen-dowager, see QUEEN. The husband of the Queen-regnant is not as such a member of the royal family; but the style of Royal Highness, and a precedence next to Her Majesty, were conferred on the late Prince-consort by statute. The Prince of Wales (q. v.), or heir-apparent to the throne, and the Princess of Wales, are distinguished by law from the rest of the royal family. By the statute 25 Edw. III., to compass the death of the Prince of Wales, or violate the chastity of the Princess of Wales, is high treason. The eldest daughter of the sovereign is styled the Princess Royal, and the violation of her chastity is, by the same statute, high treason. The heir-presumptive to the throne has no special rank or precedence as such, as his position may be altered by the birth of an heir-apparent.

The younger sons and daughters of the sovereign are entitled to a peculiar place in the House of Lords; statute 31 Henry VIII. c. 10 enacts that no person except the king's children shall presume to sit or have place at the side of the cloth of estate in the parliament chamber. A question which arose under the statute as to the position and precedence of Edward Duke of York, second son of Frederick Prince of Wales, and grandson of George II., was referred by the king to the House of Lords, who decided that, under the description of the king's children, his grandsons are included, and that the Duke of York ought to have place next to the Duke of Cumberland, the king's youngest son, and might have a seat on the left hand of the cloth of estate. But when the son and grandson of George II. became, by the death of that monarch, brother and uncle of the reigning king, they were considered bound to vacate their seats at the side of the cloth of estate.

On a reference made to all the judges by George I., it was resolved that the education and care of the king's grandchildren, when minors, and also the approval of their marriages, belongs to the king, even during their father's lifetime. This care and approval has more recently been held to extend to the heir-presumptive, and it is difficult to say how far it comprises also the remoter branches of the royal house. There are frequent instances of the crown's interposition in the case of nephews and nieces, and a few in the case of more distant collaterals. Questions regarding the marriages of the royal family are now further regulated by the Royal Marriage Act (q. v.).

On the consolidated fund are charged £8000 to Princess Frederick-William of Prussia, £6000 to the Duchess of Cambridge, £6000 to her daughter the Grand Duchess of Mecklenburg-Strelitz, £12,000

to the Duke of Cambridge, and £3000 to the Princess Mary of Cambridge.

ROYAL GEORGE, a British man-of-war, of 108 guns, the sudden sinking of which in Portsmouth harbour with all on board, 29th August 1782, created a widespread feeling of sorrow and commiseration. The R. G. was the principal vessel of Lord Howe's fleet, and while she was undergoing repairs near the keel, she was too much heeled over, so that the water rushing through the port-holes of the depressed side, speedily filled her, and she sank with all on board, including the admiral, Kempenfeldt, the captain, officers, crew, and about 300 women and children, who happened to be on board at the time —1100 in all. Of these, however, 200 were saved; but a small vessel, which happened to be anchored near, was drawn into the vortex occasioned by the R. G.'s descent, and swallowed up; and other vessels were also placed in imminent danger. Captain Waghorn, who escaped, was subsequently tried by court-martial for negligence and carelessness in the careening operation, but was acquitted. This calamitous event has been celebrated in an elegy by Cowper. Many of the guns were fished up soon afterwards, and several schemes were projected for the raising of the ship bodily, but without success, until, in 1839, the mass was blown to pieces by the explosion of large metal cases filled with gunpowder. Most of the valuables which had been in the ship were brought up, and the brass guns which were recovered sufficed to defray the cost of the operation.

ROYAL MARRIAGE ACT. Act 12 Geo. III. c. 2 enacts that no descendant of the body of Geo. II., other than the issue of princesses married into foreign families, shall be capable of contracting marriage without the previous consent of the sovereign, signified under the Great Seal; and any marriage contracted without such consent is declared void. But such descendants, if above the age of 25, may, after twelve months' notice given to the Privy Council, contract and solemnise marriage without consent of the crown, unless both Houses of Parliament shall, before the expiration of the year, expressly declare their disapproval of such intended marriage. The penalties of Præmunire (q. v.) are attached to all persons who shall solemnise, assist, or be present at any such marriage. This act was passed in consequence of the marriage of the Duke of Gloucester, brother of George III., with the Countess Dowager of Waldegrave, and of the Duke of Cumberland with the widow of Colonel Horton and daughter of Lord Irnham. The marriage of the late Duke of Sussex in 1793 to Lady Augusta Murray, daughter of the Earl of Dunmore, was declared by the Prerogative Court to be a violation of the Royal Marriage Act, and therefore null and void, in August 1794; and the claims of their son, Sir Augustus d'Este, were declared invalid by the House of Lords in 1844. The Royal Marriage Act is heartily disapproved by many as impolitic and despotic, and as tending to immorality and scandalous conduct, and was not passed without great resistance in parliament. But the influence of the government was then too strong for public opinion.

ROYAL-MAST, the fourth mast from the deck, and usually the highest carried. It is most commonly made in one piece with the top-gallant-mast. It carries the royal-yard, which bears a sail called the 'royal.' The royal-mast is surmounted by the truck, at which the pendant or other flag is displayed when necessary.

ROYAL SOCIETY (of London) consists of a number of persons associated together for the promotion of mathematical and physical science. Although the year 1660 may be regarded as the date of its final establishment, various societies and clubs having the same objects in view previously existed, and paved the way for its appearance at that special time. The meetings of one of these Clubs were held commonly at Gresham College; and the company being much increased, 'we were,' to quote from Wallis, 'about the beginning of the year 1662, by his majesty's grace and favour, incorporated by the name of the Royal Society.' Rules for the establishment of the new Society were agreed to; a regular code of laws drawn up (12th December 1662), and the Society fairly started. The meetings were held in Gresham College till the year 1710, when the Society removed to a house in Crane Court, Fleet Street. It startles the scientific inquirer of the present day to find that amongst the early subjects of discussion were the production of 'perfect sea-fowl' from barnacle shells; inquiries regarding 'the fish that turns to the wind when suspended by a thread,' &c. In 1664, the Charter-book was opened, the leaves of which are of the finest vellum, with the arms of England emblazoned on the first page, and those of the Society on the next. After copies of the charters and statutes, comes the autograph portion of the volume, containing on its first page the signatures of Charles R., Founder (dated January 9, 1664—1665), James, Fellow, and George Rupert, Fellow. The next page is occupied with the signatures of the foreign ambassadors; while the third and succeeding pages contain those of the ordinary Fellows. On the 1st March 1664—1665, it was ordered at a meeting of the council 'that the *Philosophical Transactions*, to be composed by Mr Oldenburg, be printed the first Monday of every month, if he have sufficient matter for it;' and in conformity with this order, the first number of the *Transactions* appeared on Monday the 6th March. The *Transactions* contain multitudes of valuable memoirs by the most eminent men who have appeared since the foundation of the Society, and form of themselves a complete record of the progress of science, and of its condition at any given epoch. In 1752, an important change was made in the mode of bringing out the *Transactions*. The selection of the papers deemed fit for publication had till that period been left in the hands of the secretaries. The 47th volume, which appeared in 1753, was published under the superintendence of a committee of the council—a course which has been continued to the present time. In 1780 they removed from their secluded residence in Crane Court to Somerset House, a portion of which was set apart for their use by government; and there they remained till 1857, when more commodious rooms were provided for them at Burlington House.

About twenty years ago, there was a general feeling among men of science that admission into the R. S. was too much a matter of personal favour, and it was resolved in 1848 that every candidate shall be proposed and recommended by a certificate in writing, signed by six or more Fellows, of whom three at least shall certify their recommendation from personal knowledge. At the first meeting in March, the names of all candidates proposed during the preceding year are announced by the secretary in alphabetical order, and the certificates are suspended in the meeting-room until the day of election. From this list the council select by ballot fifteen names to be recommended to the Society for election. Each Fellow may alter this list as he pleases, but as a matter of fact the selected list is agreed to by the Society, and the election takes place on the first Thursday in June. This change has proved eminently successful, and to be elected a Fellow of the R. S. is now regarded as the

highest scientific honour that any Englishman can receive. The average number of candidates has of late years been more than three times as great as the number to be selected; and this year (1865) the council had the difficult task of selecting the best 15 out of no less than 53 candidates.

Each Fellow receives a copy of all the parts of the *Transactions* and *Proceedings* published since his election, and has the free use of the library, containing nearly 50,000 volumes, and very rich in scientific books and journals. The fee paid by each Fellow is £10 for admission-money, and an annual subscription of £4; or the annual payments may be compounded for by a single payment of £60. The Society receives an annual grant of £1000.

Three medals are annually offered by the Society for scientific discoveries; viz., one Copley medal, which was first awarded in 1731; and two Royal medals, which have been regularly awarded since 1826; and in addition to these, the Rumford medal, for discoveries in light and heat, is given whenever investigations of sufficiently high merit in these departments come before the notice of the Society. See Weld's *History of the Royal Society*, 2 vols. 1848.

ROYAL SOCIETY (OF EDINBURGH) was incorporated by royal charter in 1783. It owed its origin to Principal Robertson the historian, who successfully laboured to found in Edinburgh a Society on the model of the Berlin Academy, for the investigation and discussion of subjects in every branch of science, erudition, and taste. The Society was formally constituted at a meeting held in the College Library on the 23d June 1783, where the subsequent meetings were held till 1810, when the Society purchased a house in George Street. In 1826, the Society removed to its present apartments, leased from government, in the Royal Institution building in Princes Street. The original list of members included the names of most of the literati of Scotland. The first president was Henry Duke of Buccleuch. He was succeeded in 1812 by Sir James Hall, who, resigning in 1820, was succeeded by Sir Walter Scott. On the death of Sir Walter in 1832, Sir Thomas M'Dougall Brisbane was appointed president; and was succeeded in 1860 by the Duke of Argyle. In 1864, Sir David Brewster, K.H., was elected successor to the duke, and now holds that honourable office.

The meetings of the Society are held on the 1st and 3d Mondays of every month from November to June. The admission fee of resident Fellows is £2, 2s., and the annual contribution is £3, 3s., which, after ten years, is reduced to £2, 2s., and ceases after 25 years' membership. The society is also assisted by an annual grant of £300 voted by parliament. The papers read before this learned body are published in its *Transactions*, of which 23 volumes have been published in quarto. Abstracts of the papers also appear in its *Proceedings*, of which five volumes have appeared in octavo.

The number of *ordinary* Fellows in 1865 was 277, and of *honorary* 43.

The Society has the disposal of some valuable prizes, which are bestowed on the authors of the best communications on scientific and other subjects. These are the Keith Prize, founded by Alexander Keith of Dunnottar; the M'Dougall Brisbane Prize, founded by Sir Thomas M. Brisbane; and the Neill Prize, founded by Patrick Neill, Esq., LL.D.

RUATA'N, or **RATTAN**, an island situated in the Bay of Honduras, in the Caribbean Sea, in lat. 16° 30′ N., long. 86° 30′ W. It is 30 miles long by 9 broad in its widest part; and its dependencies are Bonacca, Utilla, Helena, Barbarette, and Morat. The whole comprise the colony of the Bay Islands, and were formerly part of the British dominions, but they were surrendered in 1860 to the republican government of Honduras.

The islands were discovered by Columbus in his fourth voyage in 1502, and remained some time in possession of Spain; but were taken possession of by English settlers from Jamaica, and were eventually annexed to the British dominions, and placed under the government of the superintendent of Honduras. The surface of the island is moderately elevated, the mountains rising to 900 feet, and is well wooded, but to the westward it consists of grassy plains. Near the southern extremity are good harbours, called Port Royal, Coxen's Hole, and others, surrounded with dangerous coral reefs.

The island has a fine climate, with a prolific soil, that produces all the fruits and vegetables indigenous to the tropics. The products find their chief markets at New Orleans, Belize, and Truxillo; and the value of their exports is about £5000 annually, and imports about £4000.

The population, estimated at about 2000 souls, of whom about 200 are whites, including nearly 100 Spaniards, are principally the emigrants from the Caymans, and are an athletic race, descended from English bucaneers by African mothers. They have erected comfortable habitations, and their principal employment is fishing, and the cultivation of the soil. Fine turtle abound around the coast.

R. was the rendezvous of General Walker and the American Fillibusters (q. v.) in their repeated attacks and depredations on the states of Central America.

RUBA'SSE, a mineral much prized for ornamental uses, is rock crystal, limpid or slightly amethystine, filled internally with minute brown spangles of specular iron, which reflect a bright red, equal to that of the most brilliant ruby. The finest R. is found in Brazil. A very inferior kind occurs in the iron mines of Nassau-Ussing. The name R. is that used by lapidaries.—There is an artificial R., made by heating very pure rock crystal red hot, and repeatedly plunging it into a coloured liquid. It thus becomes full of cracks, which imbibe the colouring matter. For red, cochineal is used; for very dark red, sandal-wood; for blue, tincture of indigo or litmus; for yellow, saffron; for violet-blue, juice of buckthorn; for green, a mixture of tinctures of litmus and saffron.

RUBA'TO, TEMPO (Ital. stolen time), in Music, a capricious style of performance in which some notes are prolonged beyond their legitimate time, while others are curtailed, the aggregate value of the bar remaining unaltered. It is a style of performance which is very apt to be abused by inferior players and singers.

RU'BBLE, a common kind of masonry, in which the stones are irregular in size and shape. Walls faced with ashlar are generally packed with rubble at the back. Rubble is of various kinds, according to the amount of dressing given to the stones. Common rubble is built with stones left almost as they come from the quarry. Hammer-dressed rubble is so called when the stones are squared with the mason's hammer; coursed rubble, when the stones are squared and equal in height, &c.

RUBEFA'CIENTS are external agents employed in medicine for the purpose of stimulating, and consequently reddening, the part to which they are applied. All agents which, after a certain period, act as blisters, may be made to act as rubefacients, if their time of action is shortened. The mildest rubefacients are hot poultices, cloths soaked in very hot water, moderately stimulating liniments—as, for example, soap-liniment, with various proportions of

liniment of ammonia, or chloroform, &c. Spanish fly, in the form of *Emplastrum Calfaciens*, or warm plaster, in which the active ingredient is blunted by the free admixture of soap-plaster, resin-plaster, &c., is a good form of this class of agents. Capsicum or Cayenne pepper, in the form of a poultice, is an excellent rubefacient; it is much used in the West Indies, but is seldom employed in this country. Mustard, in the form *Cataplasma Sinapis*, or mustard poultice, and oil of turpentine, are perhaps the best of the ordinary rubefacients. The former is applied to the soles of the feet and the calves of the legs in the low stage of typhus fever, in apoplexy and coma, in narcotic poisoning, &c. It is also applied to the chest, with much advantage, in many cases of pulmonary and cardiac disease, and to the surface of the abdomen in various affections of the abdominal viscera. The best method of employing turpentine is to sprinkle it freely on three or four folds of clean flannel, wrung out of boiling water. The sprinkled surface of this pad is placed upon the skin, and a warm dry towel is laid over the flannel. Two or three such applications will produce a powerful rubefacient effect. Turpentine thus applied is serviceable in all the cases mentioned in the remarks on Mustard, as well as in sore throat, chronic rheumatism, neuralgia, &c.

RUBENS, Peter Paul, one of the greatest of the Flemish painters, was born probably at Siegen, in Westphalia, in 1577. His parents settled in Cologne in 1578, where they remained till 1587, when R.'s father died, and his mother removed with her family to Antwerp. He was first placed under Verhaagt, a landscape painter; however, inclining more to historical painting, he became a pupil of Van Noort, but soon quitted his school for that of Otho Van Veen, or Venius, who then enjoyed a high reputation; and after studying four years with that painter, went to Italy in 1600. Recommended to Vincenzo Gonzago, Duke of Mantua, he was sent on a mission by the duke to Philip III. of Spain, and on that occasion painted several portraits of Spanish noblemen. He also spent a considerable time at Venice and Rome making copies for the duke, and executing independent works, which added largely to his reputation. In 1608, after an absence of eight years, R. returned to Antwerp on account of the illness of his mother, but she died before he had accomplished the journey. He intended to return to Mantua, but was induced to remain by the Archduke Albert, governor of the Netherlands. In 1621, he visited Paris by invitation of Maria de' Medici; and in 1625, completed the series of sketches for the pictures destined to adorn the palace of the Luxembourg. R. was sent by the Infanta Isabella, widow of the Archduke Albert, on a diplomatic mission to Philip IV. of Spain, in 1628; and in the following year, on a similar mission to Charles I. of England, by whom he was knighted in 1630. R.'s success as a political diplomatist is worth noting, and seems to indicate a large, solid, and practical nature, such as painters in general do not possess. He died, very rich, in 1640. R. is the acknowledged head of the Flemish school. By the expression of powerful and energetic action, and strongly marked character—by great breadth and brilliant colouring, he successfully embodied the tendencies of the age in which he lived, to pleasures of sense, strong passion, and stirring action; and while admitting the coarseness, and almost grossness of his subjects, especially where the nude figure is introduced, we are in a manner carried away by the spirit of joyousness and an animal vigour conspicuous in his works, and the truthful manner in which he viewed nature. His portraits rank with the highest efforts in that walk of art. He painted animals admirably; and his landscapes possess great brilliancy and natural effect. Sir Joshua Reynolds (*Journey to Flanders*) says: 'Rubens was perhaps the greatest master, in the mechanical part of the art, that ever exercised a pencil.' His style has had great influence on the English school.

RUBE'OLA. See Measles.

RUBIA'CEÆ, a natural order of exogenous plants, in which, according to many botanists, the *Cinchonaceæ* are included as a suborder; but which, as restricted by others (*Stellatæ* of Ray, *Galiaceæ* of Lindley), consists entirely of herbaceous plants, with whorled leaves, angular stems, and numerous very small flowers; the calyx superior, with 4, 5, or 6 lobes, or almost wanting; the corolla wheel-shaped, or tubular, regular, inserted into the calyx, and with the same number of divisions as the calyx; the stamens equal in number with the lobes of the corolla; two styles; the fruit a dry pericarp with two cells, and one seed in each cell. There are between 300 and 400 known species, chiefly abounding in the northern parts of the northern hemisphere, and on the mountains of tropical regions. The most important plant of the order is Madder (q. v.). To this order belong also Bedstraw (q. v.) and Woodruff (q. v.).

RU'BICON, a stream of Central Italy, falling into the Adriatic, has obtained a proverbial celebrity from the well-known story of its passage by Cæsar, who, by crossing this river—which, at the outbreak of the civil war between him and Pompey, formed the southern boundary of his province—virtually declared war against the Republic. Hence the phrase, 'to cross the Rubicon,' has come to mean, to take an irrevocable step. The modern Luso, called by the peasants on its banks *Il Rubicone*, has claims to being the ancient R.; but arguments preponderate in favour of the *Fiumicino*.

RUBI'DIUM (sym. Rb, eq. 85·4) and CÆSIUM (sym. Cs, eq. 123·4) are two alkaline metals, discovered in 1860—1861, by Bunsen and Kirchhoff, by means of spectrum analysis. They resemble potassium more nearly than any other substance, and their names are derived from *rubidus*, dark red, and *cæsius*, sky-coloured, in consequence of two red lines of remarkably low refrangibility being present in the spectrum of the former, and two characteristic blue lines in that of the latter. They are widely diffused in nature, but always occur in very small quantities. They have been detected in many mineral waters, and in certain minerals; as, for example, lithia-mica, lepidolite, petolite, and felspar; and they have been found in the alkaline ashes of the beet-root. The best material for the preparation of R. is lepidolite, which will sometimes yield as much as 0·2 per cent. of the metal, while the principal source of cæsium is the brine of Dürkheim, in which both these metals were originally found; every ton of the water containing about three grains of chloride of cæsium, and rather less than four grains of chloride of rubidium. It has, however, been recently asserted that the mineral *Pollux* contains no less than 34·07 per cent. of oxide of cæsium. Both metals are so analogous to potassium, that they cannot be distinguished either from it or from one another by reagents, or before the blow-pipe. Like potassium, they form double salts with bichloride of platinum, which are much more insoluble than the corresponding potassium salt; and it is on this property that the separation of these metals from potassium is based. It is unnecessary to enter into any details regarding the compounds of these metals. It is worthy of remark that R. is electro-positive towards potassium, and that cæsium is electro-positive towards R. and potassium,

and is thus the most electro-positive of the known elements.

We have included the notice of Cæsium with that of R. in this article, because its recent discovery prevented it from being considered in its proper alphabetical place. For the same reason, we may here briefly notice another metal, INDIUM, similarly discovered during the last two years, by Reich and Richter, in the Freiburg arsenical ores. Its most striking property, and that which led to its discovery, is the indigo-blue line which all its compounds (in so far as they have been investigated) shew in the spectroscope. Its eq. is 37, its sp. gr. varies from 7·1 to 7·3; its colour is between that of tin and silver; it is exceedingly soft and very ductile; and its fusing-point is about that of lead.

RU'BRICS (Lat. *rubrica*, from *ruber*, red), in classic use, meant the titles or headings of chapters in certain law-books, and is derived from the red colour of the ink in which these titles were written, in order to distinguish them from the text. In medieval and modern use, the name is restricted to the directions which are found in the service-books of the church, as to the ordering of the several prayers, and the performance of the sometimes complicated ceremonial by which they were accompanied. The same name, together with the usage itself, is retained in the Church of England Prayer-book; and in all these, even where the direction has ceased to be printed in red ink, the name rubric is still retained. Where red ink is not employed, the rubric is distinguished from the text by italics, or some other variety of print. In the Catholic Church, a considerable controversy exists as to whether the rubrics of the missal, the ritual, and the breviary, are to be considered preceptive, or only directive—a question into which it would be out of place to enter. A similar controversy has existed at various times in the English Church. The science of rubrics is with Catholics a special branch of study, the chief authorities on which are Gavanti, Merati, Cavalieri, and other more compendious writers.

RUBRUQUIS, WILLIAM DE, one of the most distinguished of medieval travellers, was born early in the 13th c.—probably about 1228. He entered, while very young, into the Franciscan order, and being hindered in his favourite scheme of missionary labour in the Holy Land, he was sent by Louis IX. of France into Central Asia, for the purpose of forming an alliance with Sartsch, the son of Batû Khan of Kiptchak, a supposed Christian sovereign, against the infidels who held the Holy Land. Taking Constantinople as the starting-point, R., with two companions, also Franciscans, sailed for Soldaia—now Soujac—near Cherson, made his way across the steppes between the Dnieper and the Don, and crossing the latter river, reached, August 2, 1253, the camp of Sartach, who was now discovered not to be a Christian, and by whom they were sent forward to his father, Batu. When they reached the encampment of Batû, on the Volga, near its mouth, that prince refused to treat with them, and sent them forward to the Tartar emperor, Mangû Khan, whom they reached on the 27th December. At this rude court they remained for several months, and accompanied it about Easter to Kara-korum, where they found a few Europeans. Some time afterwards, R., being charged with having spoken of the emperor as an infidel, although he defended himself courageously, was compelled to return, but was treated with a certain degree of rude consideration. Proceeding along the banks of the Volga, he penetrated the difficult defiles of the Caucasus, proceeded through Armenia, Persia, and Asia Minor, to Syria, arriving at Tripoli in August 1255, having spent two years and a half in his eastern travel. As King Louis, by whom the mission had been accredited, had meanwhile returned to France, R. requested permission to follow him, in order to report the result; but fortunately for science, the Franciscan provincial refused to permit him to leave the East, and directed him to report in writing. To this fortunate severity we owe the interesting and curious account which he drew up, and of which a lucid summary will be found in Lardner's Cyclopædia, *Inland and Maritime Discovery*, vol. i. p. 261, and following. Of the later history of R., the only fact known is, that he was still living in 1293, when Marco Polo was returning from the East. His narrative is among the most plain and sober in its tone of all that have come down to us from the adventurous voyagers of the 13th century.

RU'BUS, a genus of plants of the natural order *Rosaceæ*, suborder *Potentilleæ*, distinguished by a 5-lobed calyx without bracts, and the fruit formed by an aggregation of small drupes adhering to each other upon a long *torus*. The fruit is eatable in all, or almost all, the species, which are very numerous, and natives chiefly of the colder parts of the northern hemisphere, although some are natives of warm climates, and are occasionally to be seen in our hothouses. Some of them are herbs with perennial roots, some are shrubs with subligneous—often only biennial—stems, and they have digitate, pinnate, or lobed leaves. They cause great difficulty to botanists, the varieties being extremely numerous, and the specific distinctions very uncertain. The RASPBERRY (q. v.) and BRAMBLE (q. v.) are well-known fruits. The CLOUDBERRY (q. v.) also belongs to this genus. Besides these, and the species most nearly resembling them, and which have been described along with them, notice may be taken of *R. spectabilis*, a shrubby species, with leaves of three leaflets, and fine large dark purple fragrant flowers, produced singly on long terminal flower-stalks, a native of the banks of the Columbia River. The fruit is about the size of a raspberry, dark yellow, acid, and somewhat astringent, making excellent tarts.—*R. saxatilis*, sometimes called the *Stone Bramble*, is a perennial herbaceous plant, with slender stem, leaves of three leaflets, small greenish-yellow flowers, and pleasant fruit of very few rather large drupes. It is a native of stony places, in mountainous parts of Britain.—*R. arcticus* is a small herbaceous plant with creeping roots, slender stems 2–6 inches high, each with three or four leaves, which have three leaflets; the flowers large and of deep rose colour, and a purplish red fruit of exquisite flavour. This interesting plant is a very doubtful native of the Highlands of Scotland, but is very abundant in Norway and Sweden, Siberia, and other arctic countries. In Siberia, it is known by a name signifying *Prince-berry*. A syrup, a jelly, and a wine are made of it. The fruit is highly esteemed; but although the plant grows very well in our gardens, it seldom bears fruit.

RUBY, a gem much prized, and only inferior in value to the diamond, or perhaps also to the sapphire. It is regarded by mineralogists not as a distinct species, but as a mere red-coloured variety of Sapphire (q. v.) or of Spinel. The *Balas R.* is rose-red. The Almandine R. is tinged with violet or brown. The finest red rubies are generally known as *oriental rubies*, and are indeed brought from the East, chiefly from Ceylon and the Burman empire. The best generally come from the neighbourhood of Syriam, in Pegu. In Ceylon, rubies are found in remarkable abundance in alluvial deposits, which have been searched for them for ages, whilst the natives seem never to have thought of digging

in the rock of the mountains; but Dr Gygax found innumerable small rubies, in a state of decomposition, falling to powder, in a stratum of gray granite with iron pyrites and molybdena; and Sir James E. Tennent thinks that mines might be opened with confidence of success. Sir Alexander Burnes describes a ruby-mine at Badakshan, in Bactria. Tavernier states that the throne of the Great Mogul was adorned with 108 rubies, of from 100 to 200 carats each. The king of Arracan is said to have possessed a R., in the form of a six-sided prism, about an inch in diameter, terminated by a six-sided pyramid. But the greatest R. ever heard of was that possessed by the king of Ceylon, which, according to Marco Polo, was a span in length, as thick as a man's arm, and without a flaw. Kublaï Khan sent an ambassador to demand this R., offering the value of a city as its price; but the Ceylonese monarch refused to sell it. What has become of it is not known.

RÜCKERT, Friedrich, one of the most pleasing lyric poets of Germany, was born May 16, 1789, at Schweinfurt, received his education at the gymnasium of his native town, and studied at Jena University. In 1826, he was nominated Professor of Oriental Languages at Erlangen; went in 1840 to Berlin, as professor and privy councillor, but resigned that position in 1849, and has ever since lived on his estate of Neuses in Coburg. R. began his literary career under the pseudonym of Freimund Raimar with his *Deutsche Gedichte* (German Poems, Heidelb. 1814); and *Napoleon, eine politische Komodie in drei Stücken* (Napoleon, a Political Comedy in three Parts, Stuttg. 1816). Under his own name he has published: *Kranz der Zeit* (A Wreath of the Time, Stuttg. 1817); *Oestliche Rosen* (Eastern Roses, Leip. 1822); *Gesammelte Gedichte* (Collected Poems, 6 vols., Erl. 1834—1838). As fruits of his oriental studies are to be considered his translations of Hariri's *Makamen*, under the title *Die Verwandelungen des Abu-Seid* (The Transformations of Abu-Seid, 2 vols. Stuttg. 1826); of the Indian tale, *Nal und Demajanti* (Frank. 1828); *Hamasa, oder die Aelteste Arabische Volkslieder* (Hamasa, or the oldest Arabic Ballads, 2 vols. Stuttg. 1846), and *Amrilkais der Dichter und König* (Amrilkais, the Poet and the King, Stuttg. 1817). Original poems of R., also relating to the East, are: *Morgenländ. Sagen und Geschichten* (Eastern Tales and Stories, 2 vols. Stuttg. 1837); *Erbauliches und Beschauliches aus dem Morgenländ.* (2 vols. Berl. 1837); *Rostem und Suhrab* (Erl. 1838); *Brahmansche Erzählungen* (Brahmanic Tales, Leip. 1839); *Die Weisheit des Brahmanen, ein Lehrgedicht in Bruchstücken* (The Wisdom of the Brahman, a Didactic Poem in Fragments, 6 vols. Leip. 1836—1839); *Leben Jesu* (The Life of Jesus, Stuttg. and Tüb. 1839). The titles of his dramas are: *Saul und David* (Erl. 1843); *Herodes der Grosse* (2 vols. Stuttg. 1844); *Kaiser Heinrich IV.* (2 vols. Frank. 1845); *Cristofero Colombo* (2 vols. Frank. 1845). R. is one of the most learned, versatile, and sprightly lyrists of modern times. He has tried all sorts of metres, the Greek hendecasyllabic, the old Norse alliterative verse, the old German couplet, the *Nibelungen* strophe, the popular ballad, the delicate yet stately measure of the eastern gazelle (sonnets), and every kind of European quatrains, distiches, &c.; and he has succeeded in all. Perhaps his fancy and wit are more remarkable than his depth of lyric feeling, yet the simple pathos of such pieces as the *Aus der Jugendzeit* could hardly be surpassed.

RUDD. See Red-eye.

RUDDER, in a ship or boat, is that part of the steering apparatus which is in immediate contact with the water. It is shaped as at A (fig. 1), hung

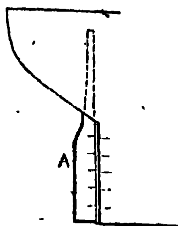


Fig. 1.


Fig 2.
A, brace; B, pintle.

to the stern-post by pintle and brace hinges (fig. 2), and the upper end passing into the vessel, is acted on by the tiller. So long as the rudder, AB (fig. 3), is in a straight line with the keel, the water which glides past the vessel acts equally on both sides, producing equilibrium; but if the rudder be turned, as AB, it will be relieved from the pressure on the side DC, while that on the side DE will act with greater force, and cause the ship to revolve round the centre of gravity, G. When the head has turned sufficiently, as to D, the rudder is again put in line with the keel, see Helm.

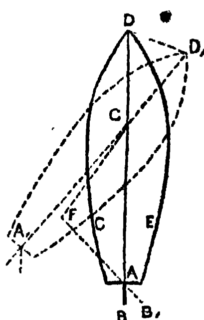


Fig. 3.

RUDDIMAN, Thomas, the greatest of Scottish grammarians, was born in Banffshire, at a place called Raggel, in the parish of Boyndie, October 1674. He received the rudiments of his classical education at the parish school, where he already gave promise of his future proficiency. At 16 years of age, he went to King's College, Aberdeen, where he took his degree of M.A. four years later. On leaving the university, he was engaged as tutor in a private family, in which capacity he remained a year, and thereafter became parish schoolmaster of Laurencekirk. Here he accidentally made the acquaintance of the celebrated physician and Latinist, Dr Archibald Pitcairne, who was so impressed with R.'s learning and sagacity, that he exerted his influence, and succeeded in getting him appointed assistant-keeper of the Advocates' Library, Edinburgh. His new office gave him ample opportunity for prosecuting his favourite studies, but the remuneration was so small, that, in 1707, he was compelled to commence business as an auctioneer. It was at this time that he began his career as an editor by publishing an edition of Volusenus's (Florence Wilson's) *Dialogue on the Tranquillity of the Mind*, to which he prefixed a life of the author. In 1709, he published Arthur Johnston's *Poetical Paraphrase of the Song of Solomon*, and the same author's *Cantica*—both in Latin. In 1714 appeared his well-known work—by which his name will always be honourably perpetuated among Scotchmen—*Rudiments of the Latin Tongue*, a text-book from which, under a great variety of forms, his countrymen still continue to be initiated into classical literature. In 1715, he published his great edition of Buchanan's works (2 vols. folio); and in that year, exchanged the calling of an auctioneer for the more congenial one of printer. In this capacity he was assisted by his brother, who became his partner, and had been originally bred

to the business. Some years afterwards, he was appointed printer to the university of Edinburgh. In 1725, he published the first part of his great grammatical work, his *Grammaticæ Latinæ Institutiones*, which is devoted to the Etymology of the language; and in 1732, the second part, which treats of the Syntax. His philological reputation rests mainly on this work, which has been re-edited in Germany by Stallbaum, and is repeatedly referred to in the Latin Lexicon of Freund. He also prepared an elaborate treatise on Prosody, of which, however, he published only an abridgment. His next appointment was that of principal keeper of the Advocates' Library. In this capacity he published a magnificent edition of Anderson's *Diplomata et Numismata Scotiæ* (1 vol. folio), and prefixed a learned introduction in Latin. Controversy with men such as Benson, who contrasted the Latin verse of Johnston unfavourably with that of Buchanan, and with Logan on the hereditary right of the kings of Scotland to the crown, consumed a great part of his time, but did not so pre-occupy his thoughts as to prevent him from publishing, in 1751, an edition of Livy in 4 vols. 12mo, a gem of typography, and still known as the 'immaculate' edition, from its entire exemption from errors of the press. R. died in Edinburgh, January 19, 1757, in his 83d year. In politics, he was, like his friend Pitcairne, an ardent Tory and Jacobite; and in private life, a most upright and estimable man. Besides the publications already noted, he edited the translation of Virgil's *Æneid* by Bishop Gawain Douglas, and appended a very valuable glossary (folio, 1710). He also founded the *Caledonian Mercury* newspaper, and published or edited a multitude of minor tracts and books. His life has been written by George Chalmers, the antiquary (1 vol. 8vo, 1794).

RUDENTURE, the moulding, in form like a rope or staff, filling the flutings of columns, usually one-third of the height. It is sometimes plain, and sometimes ornamental.

RÜDESHEIM, a small town of Germany, in Nassau, on the right bank of the Rhine, opposite Bingen, and 16 miles west-south-west of Mainz. In the vicinity is grown one of the most aromatic and fiery of the Rhine-wines (q.v.) called the *Rüdesheimer*; about 650 casks are produced yearly. Pop. 2500.

RUDOLF, or **RODOLF**, of Hapsburg, the founder of the imperial dynasty of Austria, which for a time was that of Germany, was born in 1218, and was the son of Albert Count of Hapsburg and Hedwig of Kyburg-Zäringen. R. early exhibited great personal daring and military skill, and acquired celebrity in his native canton of Aargau for the prowess and ability with which he repulsed the many bands of banditti who infested the district. The death, in 1264, of his uncle, Hartmann of Kyburg, to whose rich heritage he succeeded, raised him from the condition of a poor noble to the rank of an influential lord of extended territories, which included the greater part of Aargau, and various domains in the cantons of Bern, Lucerne, Zug, and Zürich. The able manner in which he governed these dominions, and exercised the functions of Protector of the Waldstätter or Forest Cantons, attracted the notice of some of the great electoral princes of Germany; and on the death of the Emperor Albert in 1273, R. was elected his successor, chiefly through the instrumentality of his powerful friend, the Archbishop of Mainz. The ratification by Pope Gregory XI. of R.'s title was obtained at the cost of various concessions, as, for instance, the renunciation of all jurisdiction in Rome, and of all feudal superiority over Spoleto and the Marches of Ancona; together with the cession of all right on the part of the emperor and his successors to interfere in ecclesiastical elections, or in the internal administration and management of the German Church. By this agreement, the feuds were appeased which had existed for nearly 200 years between the empire and the see of Rome, and R. was able to turn his attention to the settlement of the internal disturbances of Germany. His chief enemy was Ottocar, king of Bohemia, under whom he had once served against the Prussians and Hungarians, and who now refused to do homage to him. Fortune, however, favoured R. in the war with the Bohemian king, who, after a first defeat, again rose in arms against the empire, but was ultimately defeated and killed in battle (1278), when the emperor seized all the Austrian territories which Ottocar had possessed. Wenceslaus, the son of the slain king, having lost no time in tendering homage for the kingdoms of Bohemia and Moravia, the cause of the war was at an end, and peace being restored, R. thenceforth devoted himself to the organisation of the state. His great merit was in breaking the arbitrary power of the nobles, by compelling them to demolish the fortresses and strongholds, by means of which they carried on plundering expeditions against one another, and defended themselves from the power of the law; and we are told that in one year he condemned to death 30 refractory nobles, who had long disturbed the public peace, and razed to the ground double that number of strongholds. He also granted charters to many trading towns and municipalities, and thus gave considerable impetus to trade. The policy of his rule generally was indeed so greatly to favour the burgher and working classes, and to repress the tyranny of the powerful nobles, that his reign presented in this respect a favourable contrast to those of his predecessors, and the respect in which he was held by all ranks, bears the strongest testimony to his admirable qualities as a ruler. R. died in 1291, and was succeeded in Austria by his son, Albert I., Duke of Austria. See Schönhuth's *Geschichte Rudolf's von Habsburg* (2 vols. Leips. 1843—1844).

RUDOLF or **RODOLF II.**, eldest son of the Emperor Maximilian II. of Germany, was born in 1552, and educated at the Spanish court by the Jesuits. On the death of his father in 1576, he succeeded to the imperial crown, after having, during the lifetime of his father, been proclaimed king of the Romans. This first reigning namesake of the great progenitor of the Austrian dynasty did not add to the dignity or greatness of the Hapsburg family; and the whole of his reign of 36 years was marked by persecutions and intolerance on his side, and by discontent and even insurrection on that of his subjects. His bigotry and intolerance in forbidding Protestants the free exercise of their religion, led them to ally themselves with their co-religionists in the Low Lands and in France (1608), and by implicating the empire in foreign wars, augmented taxation, and increased the monetary difficulties of the state. R., who was gloomy, taciturn, and bigoted, had not the qualities necessary to secure the good-will of those around him, and he died, unregretted by his subjects, 20th January 1612, leaving no issue, and bequeathing to his brother Matthias, who succeeded him, an impoverished and distracted state. R.'s taste for astrology and the occult sciences, and his anxious desire to discover the philosopher's stone, led him to extend his patronage to Kepler and Tycho Brahé, whose study of astronomy was thought specially to qualify them for that much-coveted discovery; and the patronage which R. extended to the Danish discoverer, when the latter was obliged to leave his own country, through the jealousy of his brother-

nobles, has proved one of the few claims possessed by R. to the grateful remembrance of late times. The important astronomical calculations begun by Tycho, and continued by Kepler, which are known as *The Rudolphine Tables*, derive their name from this emperor, who originally undertook, but subsequently failed, for want of means, to defray the expenses incidental to the undertaking. See Kurz's *Geschichte Oestreichs unter Kaiser R.* (Linz. 1821).

RU'DOLSTADT, the chief town of the principality of Schwarzburg-Rudolstadt, is charmingly situated in a hill-girt valley, on the left bank of the Saale, 18 miles south of Weimar. Pop. 5200.

RUDRA is, in Vedic Mythology, a collective name of the gods of the tempest, or Maruts, Rudra (in the singular) being the name of their father. (See John Muir's *Contributions to a Knowledge of the Vedic Theogony and Mythology*, in the *Journal of the Royal Asiatic Society*, new series, vol. i. part 4, London, 1864.) In later and Puranic mythology (see Hindu Religion and Purâna), Rudra (the terrible) is a name of S'iva, and the Rudras are his offspring. 'From Brahmâ's forehead,' the *Vishn'u-Purân'a* relates, 'darkened with angry frowns, sprang Rudra, radiant as the noontide sun, fierce and of vast bulk, and of a figure which was half male, half female. "Separate yourself," Brahmâ said to him, and having so spoken, disappeared: obedient to which command, Rudra became twofold, disjoining his male and female natures. This male being he again divided into eleven persons, of whom some were agreeable, some hideous, some fierce, some mild; and he multiplied his female nature manifold, of complexions black or white.' See Wilson's *Vishn'u-Purân'a*.—The word *rudra* apparently comes from the Sanscrit *rud*, weep; but as the sense of this radical does not yield any satisfactory clue to the meaning of the deity called Rudra, the *Purân'as* invented a legend, according to which Rudra received this name from Brahmâ, because, when a youth, he *ran about crying aloud*; and when asked by Brahmâ why he wept, replied that he wanted a name. 'Rudra be thy name,' rejoined Brahmâ: 'be composed; desist from tears.' In this legendary etymology there is, moreover, a punning on the similarity between *rud*, cry, and *dru*, run—an illustration of one of the sources whence the later mythology of India derived some of its boundless stock of absurd myths.

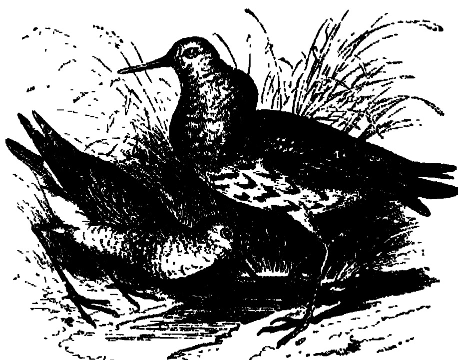
RUE (*Ruta*), a genus of plants, of the natural order *Rutaceæ*, having a short 4—5-parted calyx, 4 or 5 concave petals, affixed by a claw, 8 or 10 stamens, and a 4—5-lobed germen, with 8 or 10 nectariferous pores at the base. The species are natives of the south of Europe, the north of Africa, the Canary Isles, and the temperate parts of Asia. They are half shrubby; and have alternate, stalked, repeatedly pinnate leaves with translucent dots, the flowers small, and in terminal corymbs. Common R., or Garden R. (*R. graveolens*), grows in sunny stony places in the countries near the Mediterranean. It has greenish-yellow flowers, and glaucous evergreen leaves with small oblong leaflets, the terminal leaflets obovate. It is not a native of Britain, but is frequently cultivated in gardens. It was formerly called *Herb of Grace* (see *Hamlet*, act iv. scene 5), because it was used for sprinkling the people with holy water. It was in great repute among the ancients, having been hung about the neck as an amulet against witchcraft in the time of Aristotle. It is the *Pēganon* of Hippocrates. R. is still employed in medicine as a powerful stimulant, but the leaves must be used fresh, as they lose their virtues by drying. The smell of R., when fresh, is very strong, and to many very disagreeable; yet the Romans used it much for flavouring food, and it is still so used in some parts of Europe. The leaves chopped small are also eaten with bread and butter as a stomachic, but they must be used



Common Rue (*Ruta graveolens*).

sparingly, as they are acrid enough to blister the skin if much handled, and in large doses act as a narcotic poison. All their properties depend on an acrid volatile oil, which is itself used for making *Syrup of Rue*, eight or ten drops of oil to a pint of syrup; and this, in doses of a teaspoonful or two, is found a useful medicine in flatulent colic of children. The expressed juice of R., mixed with water, and employed as a wash, promotes the growth of the hair.—Some of the species found in the north of India resemble Common R. in their properties, and are used for the same purposes.

RUFF (*Machētes pugnax*), the only known species of its genus, is a bird of the family *Scolopacidæ*, and like snipes and many others of the family, an inhabitant of marshy places. It is found in most of the northern parts of the world, migrating southwards in autumn, and northwards in spring. It is



Ruff and Reeve (*Machētes pugnax*).

found in England and in Ireland, but not in Scotland, probably because there are few localities in that country suitable to it. In size, the R. is considerably larger than a snipe, and is about a foot in entire length, from the point of the bill to the tip of the tail. The tail is short and pointed. The wings are long and pointed. The legs are long and slender, the *tibia* naked for some distance above the tarsal joint. The bill is straight, rather

slender, as long as the head. The neck of the male is surrounded, in the breeding season, with a *ruff* of numerous long feathers, whence probably the English name. The males are remarkable for diversity of colours, no two specimens being ever similar; but ash-brown prevails, spotted or mottled with black; the head, ruff, and shoulders are black, glossed with purple, and variously barred with chestnut. The female (the *Reeve*) is mostly ash-brown, with spots of dark-brown, much more uniform in colour than the male. Their nest is usually situated on a tussock in a moist, swampy place, and is formed of the coarse grass which surrounds it. The eggs are four in number. The R. is taken for the table in spring, but the young birds taken in autumn are very preferable. They are often fattened after being taken, and are fed on bread and milk with bruised hemp-seed. After being fattened, they are sent to market. They feed readily when quite newly caught, and fight desperately for their food, unless supplied in separate dishes, which is therefore the regular practice of the feeders, who find it also advantageous to keep them in darkened apartments. The R. is gradually becoming scarcer in England, owing to the destruction of its favourite haunts, the fens, by drainage.

RUFFE, or POPE (*Acerina cernua*), a very pretty little fish of the Perch family (*Percidæ*), abundant in the lakes, slow rivers, and ditches of many parts of the middle of Europe and of



Ruffe or Pope (*Acerina cernua*).

England. It is not found in Scotland. It is never more than five or six inches long. In shape, it resembles the common perch, but has only a single dorsal fin. The R. is highly esteemed for the table. It is very easily caught, a small red worm being used as bait.

RUFFLE is a low vibrating sound, less loud than a roll, produced by drummers. It is used as a compliment to general officers and at military funerals.

RU'GBY, a market-town of England, in the county of Warwick, and 15 miles north-east of the town of that name, is pleasantly situated on a rising ground on the left bank of the Avon, and is reached by five different railways. It derives its importance and celebrity wholly from its grammar-school, founded by Lawrence Sheriff, a London shopkeeper, in 1567. The buildings of the school, consisting of a fine Elizabethan quadrangle, with cloisters, and an elegant detached chapel, are of brick, with stone-work round the windows and at the angles and cornices. The chapel contains among other monuments of head-masters, that of the late Dr Arnold. In 1865, the school was attended by 500 pupils. The endowment of the school produces about £5000 a year, and it offers 20 exhibitions of values varying from £40 to £80 a year, and tenable for four years. A park of eleven acres is set aside for foot-ball, cricket, and other games. The railways and the school give rise to almost all the trade of the town. Pop. (1861) 7818.

RU'GELEY, a market-town in the county of Stafford, on the right bank of the Trent. There are iron-works in the town, and collieries in the vicinity. Pop. (1861) 4362.

RÜ'GEN, the largest of the islands of Germany, belongs to Prussia, and lies in the Baltic, off the coast of Pomerania. Greatest length, 33 miles; greatest breadth, 28 miles; area, 423 sq. miles. Pop. 45,000. It is separated from the mainland, with which at one time it was probably connected, by a strait, about a mile in width. The island is so deeply indented on all sides by the sea, that it seems to be formed of several narrow tongues of land attached to each other, and to which the name of peninsulas has been given. On the peninsula of Jasmund is the precipitous cliff called the Stubbenkammer, the highest point of which (420 feet) is called the King's Seat, because Charles XII. witnessed from this spot a sea-fight between the Swedes and Danes, August 8, 1715. From this peak, a flight of 600 steps, cut in the rock, leads to the beach below. In the vicinity is Hertha Lake, believed to be the place where, according to Tacitus, the goddess Hertha (Earth) was worshipped. The soil of the island is productive, cattle are reared, and the fisheries around the island are carried on with profit. The scenery of R., which is everywhere pleasing, and is frequently grotesque and romantic, together with the facilities for sea-bathing, attract numerous visitors. Chief town, Bergen, in the middle of the island, with (1862) 3647 inhabitants.

RUHNKEN, DAVID, born 2d January 1723 at Stolpe, in Pomerania, received his academical education first at the Königsberg gymnasium, where he distinguished himself not only in classical learning, but even in music and drawing, and afterwards at Wittenberg University, where he spent two years in the assiduous study of ancient literature, history, and jurisprudence. He graduated 1743; after which he went to Leyden, where for six years he prosecuted his classical studies under the guidance of Hemsterhuis, and bestowed particular attention on the Greek writers, nearly all of whom he read. He devised a new edition of Plato, collected the scholia of that author, and published an excellent edition of Timæus's *Lexicon Vocum Platonicarum* (Leyd. 1754; re-edited in a much improved form, 1789). He went in 1755 to Paris, where, for a whole year, he examined the MSS. of the Royal Library and of the Library of St Germain. Hemsterhuis then got him appointed as lector (reader) in the university of Leyden, in which capacity he was the assistant and colleague of his great master. In October 1757, he introduced his series of lectures by a discourse, *De Græcia Artium et Doctrinarum Inventrice* (Leyd. 1757). For four years he discharged the duties of his office with a skill and success that raised him in public esteem, as one of the most learned men in Holland. In 1761, he succeeded Oudendorp in the chair of Eloquence and History. In 1767, he lost his friend and master Hemsterhuis; and in his capacity as rector of the university, delivered a splendid tribute to the deceased in his *Elogium Tiberii Hemsterhusii* (Leyd. 1768). In 1774, he succeeded Gronovius as librarian to the university, which he enriched with a multitude of valuable books and MSS. He died 14th May 1798, and in gratitude to his memory, the city of Leyden purchased his great library, and gave his widow an annuity of 500 florins.

R. will long be remembered as one of the best scholars and critics of the 18th century. His fine taste and sagacity, aided by an astonishing memory

and vast learning, enabled him to illustrate the authors of antiquity with wonderful success. He was also a brilliant prælector, for which he was no doubt indebted to the extreme lucidity and grace of his Latin style. A list of his works would occupy much space. In addition to those already noted, we may mention his edition of vol. ii. of Alberti's Hesychius; his edition of Rutilius Lupus; of Velleius Paterculus; of Muretus, &c. He contributed to the editions of the classics by other scholars, such as Ernesti and Schweighäuser, and thereby accumulated a vast amount of valuable material in the shape of correspondence and miscellanea. His life has been written by his famous pupil Wyttenbach (Leyd. 1799; new and improved edition, Leips. 1822, and Frieberg 1846).

RUHR, a river of Prussia, an affluent of the Rhine, rises about a mile from Winterberg, in the east of Westphalia, and flowing in a west-north-west direction, enters the plain of the Rhine at Mühlheim, and joins the great river at Ruhrort, two miles north-west of Duisburg. Entire length 143 miles.

RU'HRORT, a small town of Rhenish Prussia, on the right bank of the Rhine, 63 miles north-east of Aix-la-Chapelle by railway. It has the best harbour on the Lower Rhine, possesses many large ship-building docks, is the seat of an immense coal-trade with Holland—the coal being derived from large beds of the mineral on the banks of the Ruhr—and carries on a large carrying-trade in corn, timber, and wool, and in miscellaneous articles. A large fleet of steamers, with passengers and traffic, ply from R. up to Strasburg, and down to Holland. A railway crosses the Rhine here, and passengers and goods are carried across the river in the carriages, and without being put to the trouble of shifting their seats, by means of a large steamer, the deck of which is fitted with rails. On each side of the river is a tower, 120 feet high, connected with the railway, and furnished with a powerful engine, by means of which the railway carriages are lowered to the water on one side, and lifted to the railway on the other. Pop. (1862) 6196.

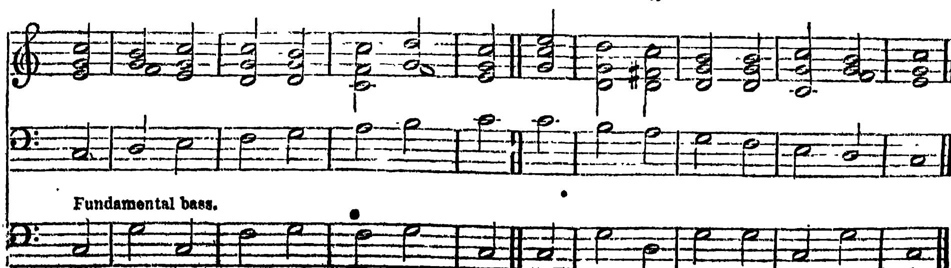
'RULE BRITANNIA,' one of the national anthems of Great Britain, which has been described by Southey as 'the political hymn of this country as long as she maintains her political power.' Its original appearance was in a masque entitled *Alfred*, the words by James Thomson the poet, and David Mallet, and the music by Dr Arne, which was performed for the first time on August 1, 1740, before Frederick, Prince of Wales, at his residence at Cliefden. The words of the ode are believed to be the composition of Mallet. *Alfred* was altered by Mallet in 1751, when three stanzas of *Rule Britannia* were omitted, and three others, by Lord Bolingbroke, substituted for them; but it is the ode in its original form that has taken root.

RULE NISI, in the English and Irish courts of law, is a technical term denoting the first step in an interlocutory application to the court, such as an application for a new trial. The usual course is for the party who takes the initiative to move, *ex parte*, for a rule nisi, i. e., an order of the court that something shall be done, *unless* the opposite party, within a certain time, usually three or six days, shew cause, i. e., some good reason why the thing proposed should not be done. When the party obtains a rule nisi, he sends a copy of it to the other party, who must then, at the time appointed, shew cause, and if the cause is deemed sufficient, the rule is discharged, i. e., the application is refused; if the cause is insufficient, the rule is made absolute, i. e., the opposite party is bound to do the thing asked, otherwise he will be liable to some disadvantage or sometimes to imprisonment, according to the nature of the subject matter.

RULE OF FAITH, the name given in polemical theology to what is regarded as the code from which the faith of Christians is to be drawn. One of the most vital of modern religious controversies is that which turns upon the question: What is the Christian rule of faith? We can but undertake to state the conflicting views. The Reformers, as a body, laid it down as a first principle, that the Word of God alone, by which they meant the written word, or the Scriptures, could safely be accepted as a rule of faith. If the Fathers could be received at all, it is only in the light of witnesses, and fallible witnesses, to the ancient interpretation of the Scriptures. This doctrine appears to be much modified in the English Church of the Laudian period, and by the successors of that school, the modern Tractarians, who admit the 'consent' of the Fathers as an authoritative interpretation of the Scriptures. Roman Catholics, on the contrary, while they admit that God's word alone is the rule of faith, yet contend that the Scriptures are not to be considered as the only depository of God's word. Much of our Lord's teaching to his apostles was not committed to writing in these authentic Scriptures; and as the teaching of Christ, wherever found, is God's word, even as much as what is written in the Scriptures, they hold that if it be possible to find such teaching elsewhere than in the Bible, the teaching so found is to be held as part of the rule of faith. Now they hold that the traditions of the church, contained in the writings of the Fathers, the decrees of councils, the decretals of popes, are a depository of Christ's teaching, less accessible, it is true, but when unanimous, not less certain than the Scripture itself; and of this certainty of such unanimous interpretation, they regard the church as at all times the authoritative expositor.

Protestants acknowledge the authority of the oral teaching of Christ himself, and of his apostles, or others speaking by inspiration; but in respect of the want of any authoritative or trustworthy record, they deny that any such teaching, not recorded in the Scriptures, is of any value to us. As to the right of the church to expound authoritatively, they deny it altogether.

RULE OF THE OCTAVE, a well-known formula of musical progression, which shews the method of accompanying or harmonising the ascending and descending scale.



RULE OF THREE is the technical term for that rule in arithmetic, otherwise called Proportion (q. v.), which teaches the finding of a fourth number proportional to *three given numbers*. The term 'rule of three' has been in use from the commencement of the 16th c.; and from the great utility of the operation in commercial transactions, it received, almost from the commencement, the name of the GOLDEN RULE (q. v.). To the ordinary 'rule of three' was added the *backer rule*, or 'rule of three inverse' (corresponding to inverse or Reciprocal [q. v.] proportion), and the 'double rule of three,' in which two or more ratios are given as determining the number to be found.

RUM, a mountainous island of Argyleshire, belongs to the group of the Inner Hebrides, 15 miles north-north-west of Ardnamurchan Point. It is 8 miles long, about 7½ miles broad; area upwards of 30,000 acres, only about 6 per cent. of which is under cultivation. Pop. (1851) 162; (1861) 73. The island is a mass of high sharp-peaked mountains, rising in Ben More to the height of 2320 feet.

RUM, a kind of spirit made by fermenting and distilling the 'sweets' that accrue in making sugar from cane-juice. The scummings from the sugar-pans give the best rum that any particular plantation can produce; scummings and molasses, the next quality; and molasses the lowest. Before fermentation water is added, till the 'sett' or wort is of the strength of about 12 per cent. of sugar; and every ten gallons yields one gallon of rum, or rather more. The flavour of rum depends mainly on soil and climate, and is not good where canes grow rankly. Pine apples and guavas are at times thrown into the still, but on the great scale, no attempt is made to influence flavour artificially. The finest-flavoured rums are produced by the old-fashioned small stills. The modern stills, which produce a strong spirit at one operation, are unfavourable to flavour. The colour of rum is imparted after distillation by adding a certain proportion (varying with the varying taste of the market) of caramel, or sugar melted without water, and thus slightly charred. Rum is greatly improved by age, and old rum is often very highly prized; at a sale in Carlisle in 1865, rum known to be 140 years old sold for three guineas per bottle. It forms a very important part of our colonial produce: the quantity imported in 1863—1864 was no less than 7,194,738 gallons, and the revenue derived from it was £1,738,399. It is distilled both in the East and West Indies.

RU'MA, a small town of Austria, in the crownland of the Temeser Banat and Servian Wojwodschaft, on an affluent of the Save, 35 miles north-west of Belgrade. The chief industry is wine-culture, and the rearing of horses. Pop. 7500.

RUMFORD, BENJAMIN THOMPSON, COUNT, an American inventor, was born at Woburn, Massachusetts, March 26, 1753. Having received the rudiments of education at a common school, he entered a merchant's office at Salem, at the age of 13, and got his living as a clerk and school teacher, while he studied medicine and physics. In 1770, he was engaged as teacher of an academy at Rumford, now Concord, the capital of New Hampshire; and in 1772, married a rich widow of that place, and was made major of militia by the English governor. The jealousy of officers over whom he had been promoted, and charges of disaffection to the royal cause, at this period of the outbreak of the American revolution, drove him from Rumford to Boston, where he became acquainted with General Howe; and when General Washington compelled the surrender of Boston, Thompson was sent to England as bearer of dispatches. In London, he so won the favour of the government by his intelligence, as to be appointed Under-secretary of State in the Colonial Office. On a change of ministry, however, he returned to America, and fought in the royal cause. When it failed, he entered the service of the king of Bavaria, by whom he was knighted; and in 1784, he was settled at Munich as aide-de-camp and chamberlain to the reigning sovereign. In this post he exhibited the energy of his mind and the fertility of his invention. He reorganised the army and improved its tactics. In 1790, he suppressed beggary throughout the kingdom, took measures for improving the breeds of horses and cattle, and laid out a park for Munich. He rapidly rose to the offices of major-general, councillor of state, lieutenant-general, minister of war, and was created Count of the Holy Roman Empire, when he chose Rumford, where his fortunes had begun, as his titular designation. In 1795, he visited London, where he was treated with much attention, and finding that his opinion was sought after on technological subjects, he published the results of his experience and the records of his labours in Bavaria. Having long and carefully studied the phenomena of heat, he set himself to devise a remedy for the smoky chimneys, which were one of the greatest nuisances at that time in England; and discovered the principles upon which fireplaces and chimneys have since been constructed. Other cases in which greater economy of the application or production of heat could be obtained, as cooking-ranges, stoves, &c., engaged much of his attention. On his return to Bavaria, he was appointed President of the Council of Regency, and soon after, Minister Plenipotentiary to the Court of St James; but the British government, holding to the doctrine of inalienable allegiance, refused to recognise him in that capacity. He declined an invitation to revisit America, where he was greatly admired, in spite of his loyalty. He finally settled in Paris; devoted himself to improvements in artillery and illumination; founded a professorship, in Harvard College, of the Application of Science to the Arts of Living; married the widow of Lavoisier; and died at Auteuil, near Paris, August 21, 1814, after making many important bequests to the Royal Society of London, the American Academy of Sciences, and Harvard University.

RU'MILI. See TURKEY.

RUMINA'NTIA, in the zoological system of Cuvier, and of almost all recent naturalists, the name given to an order of Mammalia called *Pecora* by Linnæus, an extremely well defined natural order, among the individuals of which the habit of *rumination* or chewing the cud is universal and almost peculiar. The R. are all strictly and exclusively herbivorous, and exhibit a great similarity of structure. They have no incisors in the upper jaw, the front of which is occupied by a callous pad. 'The grass is collected and rolled together by means of the long and movable tongue; it is firmly held between the lower cutting teeth and the pad, the cartilaginous upper lip assisting in this; and then, by a sudden nodding motion of the head, the little roll of herbage is either torn or cut off, or partly both torn and cut.'—Youatt. In the lower jaw, there generally appear to be eight incisors; but the two outer are more properly to be regarded as canines, and in the *Camelidæ*, they assume the ordinary canine form. Some of the R. have canine teeth in the upper jaw, and some are destitute of them. In front of the molar teeth, there is a long vacant space in both jaws. The molars are six on each side in each jaw; their surface exhibits

crescent-shaped ridges of enamel. The head is elongated, the neck is always of considerable length, the eyes are placed at the side of the head, and the senses of smell and hearing, as well as of sight, are extremely acute. The head is in many R. armed with horns, which in some are found in both sexes, in some only in the male, whilst in others they are wholly wanting; and the absence of them characterises varieties of some species, as the sheep and ox, in which they are ordinarily present. The horns differ very much in different families, even in their structure, some being hollow (true *horns*), some solid (*antlers*). All the four limbs are terminated by two large toes, which are hoofed. Behind the hoof are always two small spurs, rudimentary toes. The metacarpal and the metatarsal bones are united into one, called the *cannon* bone. The legs are rather long, and the spinal column is very flexible. The brain of the R. is small, and they do not exhibit much intelligence; nor are they distinguished by any remarkable instincts; and though easily tamed, they are scarcely susceptible of any kind of training or education. Very few, however, of the numerous species of R. have been truly domesticated, and probably much is yet to be done in this way.

The R. are generally gregarious; they are distributed over almost the whole world; but none are natives of Australia. They are found both in the warmest and the coldest regions. The flesh of all the R. is fit to be used for human food; the fat (tallow) hardens more on cooling than the fat of other animals, and even becomes brittle. The fat, hide, horns, hoofs, hair, bones, entrails, blood, and almost all parts are useful to man.

The intestines are long in all the Ruminantia. The cæcum is also long. The complex stomach, adapted to rumination, requires a more particular description. The stomach consists of four distinct bags or cavities. The first of these, into which the gullet or œsophagus enters, is, in the mature animal, by far the largest, and is called the *Paunch* (Lat. *rumen*). Into this the chief part of the food passes. It is lined with a thick membrane, presenting numerous prominent hard papillæ, secreting a fluid in which the food is soaked. The second cavity is the *Honeycomb Bag* (Lat. *reticulum*), so called from its being internally covered with a net-work of cells, like those of a honeycomb. In Scotland, it is known as the *King's Hood*. This second cavity, or stomach, has also a direct communication with the œsophagus, and fluids seem in general to pass immediately into it, but sometimes or partly also into the other cavities; and it is here that the cells for retaining water are chiefly found in the camel. The third cavity, or stomach, is the *Manyplies* (Lat. *psalterium*), so called because its lining membrane forms many deep folds, like the leaves of a book, beset with small hard tubercles. This also communicates directly with the œsophagus, by a sort of prolongation of it. The leaves of the membrane seem to serve for the absorption of superfluous fluid from the food. Finally, the food passes into the fourth cavity, which is of a more elongated form than any of the others, and is next in size to the first. This is called the *Reed* or *Rennet* (Lat. *abomasus*). It may be considered as the true stomach, homologous —if any one of the four parts can be so regarded— to the simple stomach of mammals in general. It is lined with a velvety mucous membrane in longitudinal folds. It is here that the gastric juice is secreted. In young animals, it is the largest of the four cavities, and it is only when they pass from milk to crude vegetable food that the paunch becomes enlarged, and all the parts of the complex stomach come fully into use. It seems to be by a power of what may be called instinctive volition, that the animal directs what passes through the gullet into the first cavity, the second, or even the third. It has been found by M. Flourens, who made many experiments on this subject, that the food consumed by ruminants passed chiefly into the first cavity, but part of it also at once into the second, and even, when it was given in a *mashed* or in a much comminuted state, into the third.

The particular means by which hastily swallowed food is brought from the paunch, formed into pellets at the base of the œsophagus, and brought up into the mouth for rumination, or second and more thorough mastication, are not yet very thoroughly understood, notwithstanding the patient investigations of M. Flourens. He ascribes the formation of the pellets, however, to the action of the muscular duct which connects the œsophagus with the second and third stomachs, and the power which the animal has of closing or opening at will the orifices of these cavities.

Chewing of the cud is very generally performed in an attitude of repose, and evidently affords great pleasure to the animal.

The R. are arranged by naturalists in seven families, all very natural—*Camelidæ* (see CAMEL), *Moschidæ* (see MUSK), *Cervidæ* (see DEER), *Camelopardidæ* (see GIRAFFE), *Antelopidæ* (see ANTELOPE), *Bovidæ* (q. v.), and *Capridæ* (q. v.). The most important genera and species are separately noticed.

RUMP PARLIAMENT. In order to bring about the condemnation of Charles I., Oliver Cromwell, on 6th December 1648, sent two regiments, under the command of Colonel Pride, to coerce the House of Commons. Forty-one members of the Long Parliament who were favourable to accommodation were imprisoned in a lower room of the house, 160 were ordered to go home, and only 60 of the most violent of the Independents were admitted. The clearance was called *Pride's Purge*, and the privileged members ever afterwards passed by the name of the *Rump*, forming, as it were, the fag-end of the Long Parliament. This assembly, in conjunction with the army, brought about the arraignment, trial, and condemnation of Charles I. Five years later, the Rump Parliament, forgetting that it was but the creature of the army, attempted to make a stand against certain demands on the part of the soldiers. The result was that Cromwell filled the House with armed men; the Speaker was pulled out of the chair, the mace taken from the table, the room cleared, the door locked, and the parliament declared to be dissolved. Supreme in the three kingdoms, Cromwell convoked an assembly which assumed the title of Parliament, and acquired from the name of one of its most prominent members, a leather-seller, called Praisegod Barebones, the name of the *Barebones Parliament*. The Barebones Parliament, after subsisting five months, was dissolved, and Cromwell, raised to the dignity of Protector, convoked two parliaments, and dissolved them for refusing to sanction his measures. On Oliver Cromwell's death, and Richard's succession to the Protectorate, the military malcontents coalescing with the Independents in Richard's parliament, declared the expulsion of the Rump illegal, and restored that assembly to its functions. With the revival of the Rump, its quarrel with the army revived; and the troops, again surrounding Westminster Hall, expelled it on 13th October 1659, a provisional government of officers assuming the direction of affairs. But the general dissatisfaction having led to a coalition between the Presbyterians and Royalists, the army, unable to carry on the government, was reduced to the necessity of once more restoring the Rump, which had been twice ignominiously

expelled. The advance of Monk, however, with the army of Scotland led to a general cry throughout the country for a free parliament. A number of the members who had been excluded by Pride's Purge reappearing in the House, placed the Independents in the minority; and on 16th March 1660, the despised and derided Rump at last solemnly decreed its own dissolution. The most prominent members of the Rump Parliament were Vane and Hazlerig.

RUM SHRUB, a liqueur in which the alcoholic base is rum, and the other materials are sugar, lime or lemon juice, and the rind of these fruits added to give flavour. Almost every maker has his own receipt, and much credit is assumed by each for his own especial mixture.

RUNCORN, a thriving market and manufacturing town and river-port of Cheshire, on the left bank of the Mersey, 12 miles south-east of Liverpool. There is a station of the North-western Railway on the Lancashire side of the river, and the town is the terminus for the Bridgewater and the Mersey and Irwell Canals. It is a free port, has a custom-house, and contains iron-foundries, soap and chemical works, ship-building yards, &c.; and in the vicinity are collieries, and slate and freestone quarries. Large quantities of freestone are shipped for distant ports. In 1864, 4566 vessels, of 278,000 tons, entered and cleared the port. Pop. (1851) 8049; (1861) 10,434.

RUNES, the earliest alphabet in use among the Teutonic and Gothic nations of Northern Europe. The exact period of their origin is not known. The name is derived from the Teutonic *rûn*, a mystery, whence *runa*, a whisper, and *helrûn*, divination; and the original use of these characters seems to have been for purposes of secrecy and divination. The resemblance which some of the runic characters bear to the Phœnician alphabet and others derived from it, has led to the supposition that they were first introduced by Phœnician merchants who traded with the coasts of the Baltic; and while the mass of the people were allowed to possess but a very partial acquaintance with them, the priests systematised them, and retained a full knowledge of them in their own hands, no doubt finding them useful in establishing a reputation for superior power and intelligence. Scandinavian and Anglo-Saxon tradition agree in ascribing the invention of runic writing to Odin or Wodin. The countries in which traces of the use of runes exist include Denmark, Norway, Sweden, Iceland, Germany, Britain, France, and Spain; and they are found engraved on rocks, crosses, monumental stones, coins, medals, rings, brooches, and the hilts and blades of swords. Runic letters were also often cut on smooth sticks called *rûn-stafas*, or mysterious staves, and used for purposes of divination. But there is no reason to believe that they were at any time in the familiar use in which we find the characters of a written language in modern times, nor have we any traces of their being used in books or on parchment. We have an explanation of the runic alphabet in various MSS. of the early middle ages, prior to the time when runes had altogether ceased to be understood.

The systems of runes in use among the different branches of the Teutonic stock were not identical, though they have a strong general family likeness, shewing their community of origin. The letters are arranged in an order altogether distinct from that of any other alphabetical system, and have a purely Teutonic nomenclature. Each letter is, as in the Hebrew-Phœnician, derived from the name of some well-known familiar object, with whose initial letter it corresponds. Runes being associated in the popular belief with augury and divination, were, to a considerable extent, discouraged by the early Christian priests and missionaries, whose efforts were directed to the supplanting of them by Greek and Roman characters. But it was not easy suddenly to put a stop to their use, and we find runes continuing to be employed in early Christian inscriptions. This was to a remarkable extent the case in the Anglo-Saxon kingdoms of Northumbria, Mercia, and East Anglia, where we have traces of runic writing of dates varying from the middle of the 7th to the middle of the 10th century. Its continued prevalence in this particular district has been accounted for by the fact that, after the death of Edwin and the flight of St Paulinus, the restoration of Christianity in Northumbria was effected by missionaries of the Irish school, whose predecessors had adopted the policy, not, like Augustine and his brethren, of destroying the monuments of pagan antiquity, but of allowing them to remain, and consecrating them by marking them with the symbols of Christianity. Runes are said to have been laid aside in Sweden by the year 1001, and in Spain they were officially condemned by the Council of Toledo in 1115.

The different systems of runes, all accordant up to a certain point, have been classed as the Anglo-Saxon, the German, and the Norse, each containing different subordinate varieties. The Norse alphabet is generally considered the oldest, and the parent of the rest. It has 16 letters, corresponding to our *f*, *u*, *th*, *o*, *r*, *k*, *h*, *n*, *i*, *a*, *s*, *t*, *b*, *l*, *m*, *y*, but has no equivalent for various sounds which existed in the language, in consequence of which the sound of *k* was used for *g*, *d* for *t*, *b* for *p*, and *u* and *y* for *v*: *o* was expressed by *au*, and *e* by *ai*, *i*, or *ia*; and the same letter otherwise was made to serve for more than one sound. Other expedients came, in the course of time, to be employed to obviate the deficiency of the system, as the addition of dots, and the adoption of new characters. But the runic system received a fuller development among the Germans and Anglo-Saxons, particularly the latter, whose alphabet was extended to no fewer than forty characters, in which seem to have been embraced, more nearly than in any modern alphabets, the actual sounds of a language. Till recently, the Norse runes had been most studied; but of late the Anglo-Saxon have become the subject of considerable attention. The following table exhibits the best known forms of the Anglo-Saxon, German, and Norse runic alphabets, with the names and the power of the several letters:

Anglo-Saxon.			German.		Norse.	
ᚠ	feoh	f	ᚠ	feh	ᚠ	fé
ᚢ ᚣ	ur	u (short)	ᚢ	uur	ᚢ	ur
ᚦ	thorn	th	ᚦ	dorn	ᚦ	thurs
ᚩ ᚨ	os	o (short)	ᚩ	oos	ᚬ	os
ᚱ	rad	r	ᚱ	rat	ᚱ	ridr
ᚳ	cæn	k	ᚳ	cen	ᚴ	kaun
ᚷ	gyfu	g	ᚷ	gebo		
ᚹ	wen	w	ᚹ	huun		
ᚻ	hægel	h	ᚻ	hagal	ᚼ	hagl
ᚾ	nyd	n	ᚾ	nod	ᚿ	naud
ᛁ	is	i (short)	ᛁ	iis	ᛁ	is
ᛄ	gear	y (cons.)	ᛄ	ger	ᛅ	ar

Anglo-Saxon.		German.	Norse.
eoh	e (long)	ih	
peorth	p	perd	
eolhx	x	elix	
sigel	s	sigi	sol
tir	t	ti	tyr
beorc	b	borg	biarkan
eh	e (short)	eh	
man	m	man	madr
lagu	l	lago	laugr
ing	ng	inc	
dæg	d	tag	
œthel	o (long)	odil	
ac	a (long)	ac	yr
æsc	a (short)	asc	
yr	y	yur	
ear	au	der	
ior	io		
queorn	q		
calc			
stan	st		
gar	dzh		
	z		
vult	v		

The Anglo-Saxon runes, as here given, are derived from a variety of MS. authorities, the most complete containing forty characters, while some only extend as far as the twenty-fifth or twenty-eighth letter. Neither the name nor the power of some of the later letters is thoroughly known, and they are without any equivalents in the Norse runic system. The German runes are given from a MS. in the conventual library of St Gall in Switzerland. Though the various runic alphabets are not alike copious, the same order of succession among the letters is preserved, excepting that, in the Norse alphabet, *laugr* precedes *madr*, although we have placed them otherwise, with the view of exhibiting the correspondence of the three systems. The number of characters in the Anglo-Saxon alphabet is a multiple of the sacred number eight; and we have the evidence both of a Swedish bracteate containing twenty-four characters, and of the above-mentioned St Gall MS., that there was a recognised division of the alphabet into classes of eight letters—a classification which forms the basis of a system of secret runes noticed in that MS. Of those secret runes, there are several varieties specified: in particular 1. *Iis-runa* and *Lago-runa* (of which specimens exist in Scandinavia), consisting of groups of repetitions of the character *iis* or *lago*, some shorter and some longer, the number of shorter characters in each group denoting the class to which the letter intended to be indicated belonged; the number of longer ones, its position in the class. 2. *Hahal-runa*, where the letters are indicated by characters with branching stems, the branches to the left denoting the class, and those to the right the position in that class. There is an inscription in secret runes of this description at Hackness in Yorkshire. 3. *Stof-runa*, in which the class is indicated by points placed above, and the position in the class by points below, or the reverse.

The best known inscriptions in the Anglo-Saxon character are those of two gravestones at Hartlepool in Northumberland, on a cross at Bewcastle in Cumberland, and on another cross at Ruthwell in Dumfriesshire. The inscription on the west side of Bewcastle cross, which we give as a specimen of Anglo-Saxon runes, is a memorial of Alcfrid, son of Oswiu, who was associated with his father in the government of the kingdom of Northumbria, in the 7th century.

Runes.

It has been thus deciphered into the Anglo-Saxon dialect of the period:

+ THIS SIGBECUN
SETTÆ HWÆTRED
EM GÆRFÆ BOLDU
ÆFTÆR BARÆ
YMB CYNING ALCFRIDÆ
GICEGÆD HEOSUM SAWLUM.

Or in modern English:

This memorial
Hwætred set
and carved this monument
after the prince
after the king Alcfrid,
pray for their souls.

The inscription on the Ruthwell cross, after being long a puzzle to antiquaries, was first deciphered in 1838 by Mr John M. Kemble, an eminent Anglo-Saxon scholar. It is written alternately down one side of the stone and up another, and contains a portion of a poem on the subject of the Crucifixion. Mr Kemble's interpretation received a very satisfactory confirmation by the discovery of a more complete copy of the same poem in a MS. volume of Anglo-Saxon homilies at Vercelli.

Mr D. H. Haigh, whose researches have added much to our knowledge of Anglo-Saxon runes, has endeavoured to set up for them a claim of priority

over the Norse characters. Instead of considering the additional Anglo-Saxon letters as a development of the Norse system, he looks on the Norse alphabet of sixteen letters as an abridgment of an earlier system, and finds occasional traces of the existence of the discarded characters in the earliest Norse inscriptions, and in the Scandinavian *Is-runa* and *Hahalruna*, where the letters are classified in accordance with the Anglo-Saxon groups of eight.

The Scandinavian kingdoms contain numerous runic monuments, some of them written *bous-trophedon*, or with the lines beginning alternately from the right and left; and there are many interesting inscriptions on Swedish gold bracteates, generally having reference to some design which they accompany. The Celtic races, from their connection with the Scandinavians, became acquainted with their alphabet, and made use of it in writing their own language; and hence we have in the Western Islands of Scotland, and in the Isle of. Man, runic inscriptions, not in the Anglo-Saxon, but in the Norse character, with, however, a few peculiarities of their own. Some of the most perfect runic inscriptions are in Man; others of a similar description exist at Holy Island, in Lamlash Bay, Arran, and there is an inscription in the same character on a remarkable brooch dug up at Hunterston in Ayrshire. Dr D. Wilson considers that the Celtic population of Scotland were as familiar with Norse, as the Northumbrians with Saxon runes.

We sometimes find the Norse runes used to denote numerals, in which case the sixteen characters stand for the numbers from 1 to 16; *ar* combined with *laugr* stands for 17, double *madr* for 18, and double *tyr* for 19. Two or more letters are used to express higher numbers, as *ur ur*, 20; *thurs thurs os*, 34.

See Planta's essay, *On the Runic or Scandinavian Language;* W. C. Grimm, *Ueber Deutsche Runen; Archæologia*, vol. 28; Haigh's *Anglo-Saxon Conquest of Britain;* Dr D. Wilson's *Prehistoric Annals of Scotland.*

The term RUNIC KNOTWORK is often applied loosely and inaccurately to a kind of interlaced ornamentation to be seen in MSS. and on monuments of Anglo-Saxon, Norman, Scandinavian, Scoto-Irish, and Pictish origin, from the 6th to the 12th century.

RUNGPU'R, a British district of India, in the presidency of Bengal, bounded on the E. by the Brahmaputra, and on the N. by the protected state of Cush Behar. Area, 4130 sq. m.; pop. 1,200,000. The surface is so low, that a large proportion of it is inundated during the rains. Indigo, for the manufacture of which there are numerous large factories in the district, is the great article of export.

RUNJEET-SINGH, maharajah of the Punjab (generally described by English writers as the *king of Lahore*), was born at Gugaranwalla, 2d November 1780. His father, Maha-Singh, was sirdar of Sukur-Chukeah, one of the twelve missouls or military organisations of the Sikhs, and died when R. was about 12 years old, leaving a full treasury and a well-regulated government. His widow took charge of the administration, and attempted by every means in her power to render her son effeminate, but R.'s character was not capable of being weakened by such treatment. When about 17 years old, his mother died suddenly (poisoned, as it is reported, by her son), and he immediately assumed the government. R. now shewed himself to be a prince of overwhelming ambition, and capable of attaining his object either by policy and address, or by force. In 1799, having rendered important service as an ally to Zemân Shah of Afghanistan, who had invaded the Punjab, he received from that monarch liberty to take possession of Lahore, which he accordingly did, and held it, despite the utmost efforts of his brother sirdars. To these quarrelsome neighbours he next turned his attention, and succeeded in subduing some and rendering others tributary, so that by 1809 he had greatly reduced their number. His successes having alarmed the Sikh chiefs, situated between the Sutlej and the Jumna, they besought the governor-general's interference, and this was the only occasion on which he ever came into collision with the British. Arrangements were amicably made, and Britain gave up all pretension to interference north of the Sutlej, on condition that that boundary should be carefully respected. R., thus freed from the only danger he feared, pursued his schemes of aggrandisement; and in 1812, having compelled all but three of the Punjab sirdars to resign their authority, he organised the whole under one sovereignty, and proclaimed himself *rajah*. His army had for several years previously been organised and disciplined according to the European fashion by English officers who had entered his service, so that the wild and undisciplined troops of the neighbouring states had not a chance of successfully opposing him. About this time his capital was resorted to by two of the dispossessed rulers of Afghanistan, one of whom, Shah-Sujah, was the possessor of the celebrated *Koh-i-nûr* (q. v.), which prize R. eagerly coveted, and at last obtained as the price of his assistance in recovering the throne of Cabul. In 1813, R. obtained possession of Attock, took Mûltan by storm in 1817, and in 1819 annexed Cashmere, assuming after these exploits the title of *maharajah*. In 1822, he took into his service Allard and Ventura, two French officers who formerly served under Napoleon, and by their aid he finished the reconstruction of his army, with the view of extending his dominion to the west of the Indus. In pursuance of this scheme, he wrested (1829) from the Afghans the province of Peshawur. He had now an extensive territory, peopled by more than 20,000,000, and a well-trained army of 70,000 men, of whom 36,000 were infantry, thoroughly disciplined, and this numerous host was employed for several years in desultory wars with the Afghans. Between him and the British there was always a mutual distrust, dissembled by the show of extreme cordiality; but as both parties scrupulously abstained from any cause of offence, pacific relations were never interrupted. In 1836, his army was totally defeated by the Afghans, but this reverse seems not in the slightest degree to have affected the stability of his rule, even in the most recently-acquired districts; and, strange to say, his long reign was not disturbed by a single revolt. He died 27th June 1839. R. is one of the most remarkable men in eastern history; in person he was short and slight; his countenance, deeply marked with small-pox (which had deprived him of the sight of one eye), was, however, expressive of strong determination, to which the calm of his brilliant dark eye lent additional effect. He was totally uneducated; could neither read nor write; yet the indefatigable energy of his administration, and his clemency and moderation (rare qualities in an Asiatic despot), are without a parallel in the East. See *English Cyclopædia;* Cuvilier-Fleury, *Notes Historiques sur le General Allard; Revue Britannique*, vols. x., xiii., xxiii., and xxvii.

RUNNER (*flagellum*, a whip), in Botany, is a long slender branch proceeding from a lateral bud

of a herbaceous plant with very short axis, or in popular language, without stem. It extends along the ground, and produces buds as it proceeds, which often take root and form new plants. Strawberries afford a familiar example. Another is found in *Potentilla anserina.* Runners are common in the genus *Ranunculus.*

RUNNERS. See KIDNEY BEAN.

RU'NNIMEDE, a long stretch of green meadow, lying along the right bank of the Thames, from which it is partly concealed by plantations of willows, 20 miles west-south-west of London. It is proposed to derive the name from the Sax. *rhynes,* water-brooks, which abound in these meadows; others suppose the word to be *Runningmead,* referring to the horse-races which appear to have been held here from time immemorial, and which still take place in the month of August. R. is of great historical interest, from the fact that Magna Charta was signed by King John, June 19, 1215, either on this meadow, or on Charter Island, lying a short distance off the shore. The Great Charter itself professes to have been signed *per manum nostram in prato quod vocatur Runnimede.* See MAGNA CHARTA.

RU'NRIG LANDS, a peculiar species of property known in Scotland, by which alternate ridges of land belong to two individuals respectively. The origin of holding lands in this way is said to have arisen out of the practice of common defence and watching, and the common ploughing and labouring necessary or natural in the occupation of burgh acres and lands near towns. Each party is absolute proprietor of his own ridge; but owing to the obstruction often caused to agricultural improvement, a mode of compulsory division or allotment of the lands was introduced by statute in 1695. This remedy, however, does not apply to burgh acres, or to patches of land less than four acres in extent.

RUPEE' is the name of a silver coin current in India, of the value of 2*s.* English. The word is a corruption of the Sanscrit *rûpya,* from *rûpa,* shape, form, meaning, according to Pân'ini, a coin—not necessarily of silver—on which the shape *of a man,* according to the Kâs'ikâ commentary on this grammarian, is struck; and if this ellipsis of the word *man* is correct, as it very probably is, the word rupee would be of great numismatic interest, inasmuch as it would prove that even as early as at the time of the grammarian Pân'ini (q. v.) coins existed with a *human* figure impressed on them. The coin bearing the name of rupee was first struck by Shir Shah, and was adopted by Akbar and his successors; it was of the weight of 175 grains troy, and was considered to be pure; but in the decline of the Mohammedan empire every petty chief coined his own rupee, varying in weight and value, though usually bearing the name and titles of the reigning emperor. In the reign of Shah Aalam, a great variety of coins bore his name and the years of his succession, until 1773, when they were suppressed in the territories subject to the East India Company, and a rupee was struck, called the Sicca rupee, with an inscription on it, which, translated, runs: 'The king, Shah Aalam, the defender of the faith of Mohammed, the shadow of the grace of God, has struck this coin, to be current through the seven climes;' and on the reverse: 'Struck at Murshidabad, in the 19th year of the auspicious accession.' Though rupees were coined also at Dacca, and finally only at Calcutta, and also at various dates, the place of coinage (the mint of Murshidabad) and the date just named (the 19th of Shah Aalam's reign) remained unaltered, in order to put a stop to the practice which money-changers had introduced, of levying an arbitrary rate of discount on rupees of different places of coinage and of previous dates, without reference to any actual diminution of weight by wear. Although the Dacca rupee was thus the actual medium of exchange, the Company's accounts were for a long time kept in a different valuation, or that of the *Chalani,* or current rupee, 100 Sicca rupees being reckoned as equivalent to 116 Chalani rupees. The Sicca rupee served also as a unit of weight—80 Sicca weight being equal to one *ser,* and 40 sers to one *man* or *maund* = 82 lbs. Beside the Sicca rupee, two other rupees were current in the Bengal presidency—the Benares rupee, which ceased to be struck in 1819, and the Farakhabad rupee. At Madras, the rupee of the Nawabs of the Carnatic, originally struck at Arcot, and at Bombay that of the Nawabs of Surat, became the currency of the Company. In 1818, the standard of the Sicca and Farakhabad rupees was altered, but their intrinsic value was unaffected, as they continued to have the same amount of fine silver. Other changes of these coins took place—of the latter in 1824, of the former in 1833; but in 1835, the coinage of the Company was entirely remodelled, and a coin, thenceforth termed the Company's rupee, with its proportionate subdivisions, was struck to replace all the former currencies, being of the same weight and fineness throughout, and bearing inscriptions in English, or on one face the head and name of the reigning sovereign of Great Britain and Ireland, and on the reverse the designation of the coin in English and Persian, with the words 'The East India Company' in English. The latter, of course, have disappeared since India has been placed under the direct government of the English crown. The weight, intrinsic purity, and value of the British currency of these several coins are as follows:

		Weight.	Pure Contents.		
		Troy Grains.		s.	d.
Sicca Rupee,	1773	179 666	175 923	2	2
Do.,	1818	191·916	175·923	2	2
Do,	1823	192·000	176 000	2	2
Benares,	1806	174·760	167·000	2	0⅝
Farakhabad,	1803	173 000	165 215	2	0⅜
Do,	1819	180·234	165·215	2	0⅜
Do.,	1824	180·000	165·000	2	0⅜
Madras,		176 400	166·480	2	0⅝
Do.,	1818	180·000	165·000	2	0⅜
Bombay,	1800	179·000	164·680	2	0⅜
Do.,	1829	180 000	165·000	2	0⅜
East India Company's,	1835	180 000	165·000	2	0⅜

But as silver is subject, in the London mint, to a seigniorage of nearly 6 per cent., the London mint produce of the rupee, if of full weight and standard value (11 dwts. fine) should be 1*s.* 11*d.* For further detail, see H. H. Wilson, *Glossary of Judicial and Revenue Terms* (Lond. 1855), under RUPEE.

RUPERT, PRINCE, the son of the Elector-Palatine Frederick V., and Elizabeth, daughter of James I. of England, was born in 1619. In 1642, he received from his uncle, Charles I. of England, a commission to command a regiment of horse at Worcester against the Parliamentarians. The impetuosity with which he charged the enemy there, and in the battle of Edgehill, would have proved of greater use to the Royalists had not his rashness in pursuing the wavering foe nearly counteracted the advantages which he had already gained. Subsequently, at Chalgrove, Newark, and Newbury, he was more successful; but his petulant disregard of orders, and his hasty retreat from the field of battle at Marston Moor, resulted in a signal

defeat, the consequences of which had a most disastrous effect upon the fortunes of the Royalist party. His conduct at Naseby, and his hasty surrender of the city of Bristol, irritated the king, who forthwith deprived him of his command, and requested him to leave England without delay. In 1648, however, he was recalled and appointed to the command of the royal fleet. In this new vocation he acquitted himself with much daring and somewhat more caution, and for three years he kept his ships afloat, after escaping the blockade in which he had been held for a twelvemonth off the Irish coast by the great parliamentarian Admiral Blake; but in 1651, the latter attacked the prince's squadron, and burned or sunk most of his ships. With the few vessels still remaining to him, R. escaped to the West Indies, where, in concert with his brother Maurice, he led a bucaneering life, maintaining himself and his men by seizing upon English and other merchantmen. After a few years spent in this manner, R. managed to elude the vigilance of Cromwell's captains, and made good his way to France, where he remained till the restoration of his cousin, Charles II. R. served with distinction under the Duke of York, and in concert with the Earl of Albemarle, against the Dutch, and died in 1682 in the enjoyment of various offices and dignities, being a privy councillor, a member of the Admiralty, governor of Windsor Castle, &c. The last ten years of his life were spent in retirement in the pursuit of chemical, mechanical, and physical researches, for which he evinced considerable aptitude. Although it is certain that he did not discover the art of engraving in mezzotinto—the real inventor of which appears to have been a German, Von Tregen, whose early works bear the date of 1642—R. no doubt improved the mechanical mode of the art, which he described and illustrated for the Royal Society of London in 1662, after he had completed several interesting engravings on the new principle. The glass bead known as Prince Rupert's Drop (q. v.) derives its name from the prince.

RU'PERT'S LAND, so called from Prince Rupert (q. v.), who was one of the founders of the Hudson's Bay Company, the official designation of that extensive tract in North America which forms the basin of Hudson's Bay and Strait, and is bounded on the west, south, and north by the water-sheds of the Arctic, St Lawrence, and Atlantic rivers. The western boundary is a little indefinite, but it may without much risk of error be assumed to run from Deer Lake in a south by east direction, enclosing a portion of the territory west of Lake Winipeg (q. v.) and the Red River Settlement (q. v.). The whole of this vast territory slopes inwards towards Hudson's Bay, and is well supplied with rivers of sufficient magnitude to serve for commercial highways. The mountains of this region, which are chiefly on the boundaries, are of primitive rock, and a great portion of the country is densely wooded. The soil is rich, but on account of the severity of the climate—which is not only of a generally low temperature, but exceedingly variable in summer and autumn—the cereals and other alimentary plants are not cultivated to any extent; in fact, they are only planted in the neighbourhood of the trading posts of the Hudson's Bay Company (q. v.) and in the agricultural settlement on Red River, in the south-west. In the north, the vegetation and climate are those of the polar regions. The chief dependence of the inhabitants of R. L. for food and clothing is on the animal kingdom, which is here most abundantly represented. Beavers are still found, and bears, otters, martens, and musk-rats are abundant, their skins forming the chief commercial product of the country. There are also abundance of foxes of various colours, bears, wolves, Canadian lynxes, &c. Among the animals used for food are the wapiti, reindeer, moose, and other species of deer; the musk-ox, hares, and an immense variety of wood-fowl and other birds. The numerous rivers and lakes are abundantly stocked with fish. The population, which is scanty, is composed of British or Canadians, and aboriginal tribes.

RU'PIA is a somewhat severe form of skin-disease. It is characterised by flattish, distinct *bullæ* or blebs, containing a serous, purulent, or sanious fluid, which become changed into thick scabs. Several varieties of this disease have been established by dermatologists. In its simplest form, the blebs are not preceded by any inflammatory symptoms, are about an inch in diameter, and contain a fluid which is originally thin and transparent, but soon thickens, becomes purulent, and dries into brown ragged scabs, which are elevated in the centre. The scabs are easily separated, and leave ulcerated surfaces, on which several successive scabs usually form before healing ensues. In a more severe form, known as *Rupia prominens*, the scab projects so much in the centre as to resemble a limpet-shell in form.

Rupia is a chronic disease, and is usually limited to the limbs, the loins, and the nates. It is not contagious, and generally attacks persons debilitated by old age, intemperance, bad living, or previous diseases, especially small-pox, scarlatina, and syphilis. The general treatment consists mainly in the administration of tonics, such as quinia, the mineral acids, ale, wine, animal food, &c. Some writers strongly recommend the tincture of serpentaria; and there is no doubt that certain cases which will not yield to tonics, rapidly improve when treated with iodide of potassium. The local treatment consists in puncturing the blebs as soon as they arise, in removing the scabs by poulticing, and in applying a slightly stimulating application—such as a solution of nitrate of silver—to the subjacent ulcers. The disease is frequently tedious and obstinate, but the patient almost always ultimately recovers.

RUPPI'N, Neu, a town of Prussia, in the province of Brandenburg, on a small lake of the same name, which communicates by water with the Elbe, 38 miles north of Potsdam. It contains a castle, a lunatic asylum, and 10,000 inhabitants, who are engaged in brewing, spinning, and the manufacture of linen and woollen cloths.

RU'PTURE. See Hernia.

RURAL DEAN, an official, ordinarily a beneficed clergyman, appointed in a diocese to maintain in a certain district, called a deanery, a supervision over the condition of churches, church furniture, glebe houses, schools, the appliances of public worship, and all other things appertaining to the service, and to report on all to the bishop as occasion may arise.

RURIK, who is considered to have been the founder of the Russian monarchy, was, according to most authors, a 'Varangian' of Scandinavian origin, who was invited by the Slaves of Novgorod to come and rule over them; according to others, he was the chief of a tribe of Norse colonists which was located near the Gulf of Finland, and, after a long contest, succeeded in subduing the northern Slaves and some neighbouring tribes of Finns; while Kostomarof attempts to prove that he was a Lithuanian. That he was either a Scandinavian or of Scandinavian origin, there seems to be very little doubt, and it is as generally maintained that, accompanied by his brothers, Sinaf (Sineous) and

Truvor, he, at the head of a small army, took possession of the country to the south of the Gulf of Finland, Lakes Ladoga, Onega, and Beloe in 861 or 862, and laid the foundation of a monarchy. His brothers afterwards settled, the one at Bielo-ozero, and the other at Izborsk; but dying without issue, their principalities were united to Novgorod by Rurik. Novgorod was made the seat of government in 864 or 865, and the various insurrections of his Slavic subjects were quenched in blood, Vadim, their leader, whose valour is celebrated by the ancient chroniclers, perishing by R.'s own hand. To secure himself and his descendants in their newly-acquired territory, R. invited various colonies of Varangians to settle in the country, and after reigning peaceably from this time, he died in 879. During his reign, some of the Varangians attempted a land expedition against Constantinople, but renouncing the scheme settled on the banks of the Dnieper, and founded the little state of Kiev. The family of R. reigned in Russia till the death, in 1598, of Feodor, son of Ivan the Terrible, when, after a brief intestine contest, it was succeeded by the nearly allied House of Romanoff (q. v.). Many noble families of Russia, such as Odojefski, Obolenski, Dolgorouki, Lfot, Belosselski-Beloserski, and Gagarin, are legitimately descended in the male line from R.; and the princes of Romodanofski-Ladyshenski are legitimate descendants in the female line.

RU'SA, a genus of *Cervidæ*, or subgenus of *Cervus* (see DEER), containing a number of species of deer, natives of the forests of the East Indies, which may be described as stags with round antlers, a snag projecting in front just above the base of each, and the top forked, but the antlers not otherwise branched. They are generally of large size, and among them are some of the finest kinds of Asiatic deer. The GREAT R. (*R. Hippelaphus*) is supposed by some to be the *Hippelaphus* of Aristotle; but his description is not complete enough to identify the species. It is a native of Java, Sumatra, &c., and is about the size of a large stag, with brown rough hair, the neck with a long mane.—The SAMBUR or SAMBOO (*R. Aristotelis*) of India, is a



Sambur (*Rusa Aristotelis*).

similarly large and powerful animal, and no Indian deer is more sought after by European sportsmen. It also is supposed by some to be the *Hippelaphus* of Aristotle. The colour is sooty brown, and the male has a mane. It is solitary in its habits, and delights in low forests where water abounds.—The Axis (q. v.) is very nearly allied to this genus.

RU'SCUS. See BUTCHER'S BROOM.

RUSH (*Juncus*), a genus of plants of the natural order *Junceæ*, having a glume-like (not coloured) perianth, smooth filaments, and a many-seeded, generally 3-celled capsule. The species are numerous, mostly natives of wet or marshy places in the colder parts of the world; some are found in tropical regions. Some are absolutely destitute of leaves, but have barren scapes (flower-stems) resembling leaves; some have leafy stems, the leaves rounded or somewhat compressed, and usually jointed internally; some have plane or grooved leaves on the stems; some have very narrow leaves, all from the root. The name R. perhaps properly belongs to those species which have no proper leaves; the round stems of which, bearing or not bearing small lateral heads of flowers, and popularly known as *Rushes*, are used for plaiting into mats, chair-bottoms, toy-baskets, &c.—The SOFT R. (*J. effusus*) is a native of Japan as well as of Britain, and is cultivated in Japan for making mats. In ruder times, when carpets were little known, rushes were much used for covering the floors of rooms; to which many allusions will be found in early English writers. The stems of the true rushes contain a large *pith* or soft central substance, which is sometimes used for wicks of candles. There are 20 or 22 British species of R., some of which are very rare, some found only on the highest mountains, but some are among the most common of plants. They are often very troublesome weeds to the farmer. Thorough drainage is the best means of getting quit of them. Lime, dry ashes, road scrapings, &c., are also useful. Tufts of rushes in pasture are a sure sign of insufficient drainage. Many marshy and boggy places abound in some of the species having leafy stems and the leaves jointed internally, popularly called *Sprots* or *Sprits*, as *J. acutiflorus*, *J. lamprocarpus*, and *J. obtusiflorus*. They afford very little nourishment to cattle; but are useful for making coarse ropes for ricks, &c., which are stronger than those made of hay.

RUSH, BENJAMIN, M.D., an American physician, was born near Philadelphia, December 24, 1745, was educated at Princeton College, studied medicine in Philadelphia, London, Edinburgh, and Paris, and in 1769 was made Professor of Chemistry in the Philadelphia Medical College, and became a contributor to medical literature. Elected a member of the Continental Congress, he advocated and signed the Declaration of Independence. In 1777, he was appointed Surgeon-general and Physician-general of the continental army. His duties did not prevent him from writing a series of letters on the constitution of Pennsylvania, which was changed by his influence. He resigned his post in the army, because he could not prevent frauds upon soldiers in the hospital stores. In 1785, he planned the Philadelphia Dispensary, the first in the United States; and was a member of the convention which ratified the Federal constitution. Retiring from politics, he became Professor of the Theory and Practice of Medicine in the Philadelphia Medical College; and was so successful in the treatment of yellow fever in 1793, that he was believed to have saved the lives of 6000 persons. His practice, in consequence, became so large that he prescribed for 100 patients a day, whom he saw even at his meals. Virulently attacked by Cobbett, who published a newspaper in Philadelphia, he prosecuted him for a libel, and recovered 5000 dollars damages. His medical works produced honours from several European sovereigns. The chief of them were *Medical Inquiries and Observations*, *Diseases of the Mind*, *Medical Tracts*, *Health, Temperance, and Exercise*. In 1779, he was appointed Treasurer of the United States Mint, which post he held until his death in Philadelphia, April 19, 1813.

RUSH-NUT. See CYPERUS.

RUSHWORTH, JOHN, an English author, whose work entitled *Historical Collections of Private Passages of State, Weighty Matters in Law, and Remarkable Proceedings in Parliament*, is a most important contribution to our knowledge of the civil war, and the events that led to it, belonged to an ancient family in Northumberland, and was born there about 1607. He studied at Oxford, but left the university without taking a degree, and settled in London as a barrister. His interest in political affairs was, however, so strong, that he appears to have spent a great deal of his time, for many years, in attending the Star Chamber, the Court of Honour, the Exchequer Chamber, Parliament, &c., and in taking down short-hand notes of the proceedings. When the Long Parliament met in 1640, R. was appointed assistant to Mr Henry Elsyngne, clerk of the House of Commons, an office which afforded him ample opportunities for adding to his *Collections*. He rendered a variety of important services to his party during the civil war. The restoration of Charles II., in 1660, was fatal to his fortunes. Though not molested, he was one of those to whom the 'cold shoulder' was shewn by the triumphant royalists. In 1677, Sir Orlando Bridgman, Lord Keeper of the Great Seal, appointed the old man, now (it is conjectured) in straitened circumstances, his secretary; and curious to say, we find him, two years after, a member of parliament. In 1684, when he had reached the age of 77, he was arrested for debt, and imprisoned in the King's Bench, where he died in 1690. His last years were rendered doubly miserable, partly by the loss of his understanding, and partly by his addicting himself to intemperance.

R.'s *Historical Collections* were published in four parts at different times. The first, embracing the period from 1618 to 1629, was published in 1659; the second, embracing the period from 1629 to 1640, in 1680; the third, embracing the next five years, in 1692; and the fourth, extending to 1648, in 1701. The whole was republished in 1721. The work has been violently attacked by royalist and High Church writers, as unfair, and even false, but their charges have not been substantiated.

RUSKIN, JOHN, the most eloquent and original of all writers upon art, is the son of a wealthy wine-merchant, and was born in London in 1819. He studied at Christ Church, Oxford, where he gained the Newdegate prize for English poetry in 1839, and took his degree in 1842. The year following appeared the first volume of his *Modern Painters*, the primary design of which was to prove the infinite superiority of modern landscape-painters, especially Turner, to the old masters; but in the later volumes (the 5th and last was published in 1860), the work expanded into a vast discursive treatise on the principles of art, interspersed with artistic and symbolical descriptions of nature, more elaborate and imaginative than any writer, prose or poetic, had ever before attempted. *Modern Painters* was essentially revolutionary in its spirit and aim, and naturally excited the aversion and hostility of the conservatives in art. But the unequalled splendour of its style gave it a place in literature; crowds of admirers and disciples sprang up; the views of art enunciated by R. gradually made way; and without alluding further to the fierce and scornful controversies which they excited, it may be said that, with whatever abatements necessitated by the conflict of criticism, they have substantially rooted themselves in the English mind, and have largely determined the course and character of later art. In 1849 appeared *The Seven Lamps of Architecture*; and in 1851—1853, *The Stones of Venice*, both being efforts to introduce a new and loftier conception of the significance of domestic architecture. They were illustrated by the author himself, who proved himself in these volumes to be one of the best and most accurate draughtsmen in England. About this time, *Pre-Raphaelitism* began to develop itself as a distinctive phase of modern art, and R. warmly espoused its cause. His Letters to the *Times*, his Pamphlet on the subject (1851), and his 'Notes' on the Royal Academy Exhibitions (1855—1860), besides numerous casual expressions of opinion, bear testimony to the ardour and sincerity of his admiration. In 1854, he published four singularly pithy and ingenious *Lectures on Architecture and Painting* (previously delivered at the Edinburgh Philosophical Institution); and in 1857, two *Lectures on the Political Economy of Art* (previously delivered at Manchester). These are R.'s most celebrated productions; but we may further mention his *Notes* on Turner's Pictures and Drawings exhibited in Marlborough House (1857); *Elements of Drawing, in Three Letters for Beginners* (1857); *Elements of Perspective; The Two Paths;* and a variety of review articles, of which the most important are those on Lord Lindsay's *Christian Art*, and Eastlake's *History of Oil Painting*, in the *Quarterly Review*.

RUSSELL, HOUSE OF. The first dukedom of Bedford (q. v.) expired in the person of the great Regent of France (in the time of Henry VI.), with whom the present dukes are unconnected by affinity. The early descent of the Russells, and their derivation from the Du Rozels of Normandy, have been traced by Mr Wiffen in his *Memoirs of the House of Russell*. This great historical family is said to derive its descent from Olaf, the sharp-eyed king of Rerik, in the 6th c., one of whose descendants, Turstain, a Scandinavian jarl, settled in Normandy, on its conquest by the Northmen, and became possessed of the barony of Briquebéc, and the castle of Rozel, near Caen. In a charter of Matilda, wife of the Conqueror, dated 1066, Hugh de Rozel appears as a witness, and is no doubt the same knight who accompanied William in his invasion of England, and assisted at the battle of Hastings. His name, together with that of his brother, are found on the roll of Battle Abbey. They both accompanied Duke Robert of Normandy in the first Crusade, where the elder died. The younger, Hugh de Rozel, upon his return from the Holy Land, established himself in England, and was the progenitor of Sir James Rozel, or Russell (as it had then begun to be called), governor of Corfe Castle in 1221, and of Sir W. Russell, who represented Southampton in the first parliament of Edward II. From the latter Russell directly descended Sir John Russell, one of the most valiant soldiers of the age of chivalry. His son, Sir John Russell, was Speaker of the House of Commons in the time of Henry VI. The high fortune and eminence of the House of R. date from his grandson, JOHN RUSSELL, one of the most accomplished gentlemen of his time, who, in 1538, was elevated to the peerage, under the title of 'Lord Russell, Baron Russell of Cheyneys, county Buckingham.' His son, the second earl, was a person of eminence in Queen Elizabeth's reign, and was, like his father, a Knight of the Garter. The next notable member of the family was EDWARD RUSSELL, who was bred to the sea, and was groom of the bedchamber to the Duke of York, afterwards James II., but upon William Lord Russell's judicial murder, retired from court. Strenuously supporting the Revolution, he obtained high naval commands from William III., and distinguished

himself as one of the most eminent naval heroes of the period, particularly by his victory over the French fleet at La Hogue, in 1692. His cousin was—

LORD WILLIAM RUSSELL, son of William, 5th earl, who has left an unperishable name, as one of the most glorious martyrs of English liberty. He was born September 1639; was educated at Cambridge; passed some years at Augsburg and other places on the continent, and returned to England at the Restoration. In 1678–1679, he was returned to parliament for the county Bedford. His first public act was worthy of his subsequent career. He inveighed against the corruption of the Cabal, the influence of France, the dishonourable commencement of the war with Holland, and the fraud practised upon the bankers. He was ever afterwards found conspicuous wherever the designs of the court could be traversed, or the cause of constitutional liberty befriended. He appeared publicly in the King's Bench at Westminster Hall, June 16, 1680, and presented the Duke of York as a recusant. He also carried up to the House of Lords the bill of exclusion against the duke, at the head of more than 200 members of the Commons. This bill, setting forth that the Duke of York was a papist, declared him incapable of succeeding to the crown. The king and duke determined to be revenged upon Russell and the other leaders of the Whig party. Charged as participators in the Rye House Plot (q. v.), Lord Russell, the Earl of Essex, and Algernon Sidney were arrested. Russell was, July 13, 1683, arraigned at the Old Bailey for high treason. Infamous witnesses easily satisfied a packed jury. As they were about to withdraw, the prisoner said: 'I call Heaven and earth to witness that I never had a design against the king's life.' But the jury pronounced the fiat that condemned Russell to the block, and the horrible sentence of death for high treason was forthwith pronounced. The king and the duke were determined to have his blood, and to crush the leaders of the Whig party. Some of the Tory ministry ventured to plead in his favour, but in vain. The Earl of Bedford had gained the king's favourite, the Duchess of Portsmouth, to his interest, and offered, through her, £100,000 for the life of his son. To satisfy his aged father, and at the earnest request of his afflicted wife, Russell himself petitioned the king. He solemnly disclaimed the least intention against the king's life, or the least design to change the constitution. There is reason to believe that Charles was disposed to relent, but that the Duke of York insisted upon the prisoner's death, which took place July 21, 1683. The simple relation of his last hours by Bishop Burnet, his intimate friend and companion, is justly considered one of the most pathetic passages in history. The murder of Russell, perpetrated for the most unconstitutional end by the most unconstitutional means, followed by that of Sidney, rendered the despotism of the Stuarts odious, and led, in the next reign, to the overthrow of the family. R. died in the 42d year of his age, leaving a name to be remembered and revered wherever truth has a sanctuary or liberty a shrine. His attainder was annulled after the Revolution. His widow, LADY RACHEL WRIOTHESLEY, second daughter and heiress of Thomas Earl of Southampton, survived her lord more than forty years. She cherished the memory of her lord with the most tender recollections. She died September 29, 1723, at the advanced age of 86. Her eldest son by Lord Russell was WRIOTHESLEY, second Duke of Bedford.

JOHN, fourth duke, was First Lord of the Admiralty in the Pelham administration of 1744. He became, in 1756, Lord-lieutenant of Ireland. In 1762, he was accredited Minister Plenipotentiary to the court of France, and signed at Fontainebleau the preliminaries of peace with France and Spain. He was President of the Council in the administration formed by Mr Grenville in the autumn of 1763. His concern with public affairs extended over the important term comprised between the fall of the administrations of Walpole and Chatham. When First Lord of the Admiralty (from 1744 to 1748), he shared with Mr Pelham, the premier, and the Duke of Newcastle, the substantial power of the government. His correspondence, preserved at Woburn Abbey, and given to the world by Earl Russell, contains authentic materials for the illustration of the political history of England from 1744 to 1770. The introduction to the first volume contains a brief but able historical sketch by the noble editor of the period from the administration of Walpole to 1748, and some interesting particulars of the private life and personal character of the duke. He died in 1771, and was succeeded by his grandson—

FRANCIS, fifth duke, born in 1765. He was a steady friend to the cause of popular freedom, and was regarded by his friends, among the most devoted of whom was Charles James Fox, with feelings of attachment amounting to enthusiasm. He died unmarried in 1802, and was succeeded by his brother—

JOHN, sixth duke, born 1766, father of Lord John (now Earl) Russell (q. v.). He died October 20, 1839, and was succeeded by his eldest son—

FRANCIS, seventh duke, who, after a short career in the Lower House, was summoned to the House of Lords in his father's barony of Howland. He declined office, but invariably supported the views and measures of the Whig governments, and in the dissensions among the Whig party, the political congresses at Woburn exercised great influence. He was much consulted by his distinguished brother, when First Lord of the Treasury, and on more than one occasion, his advice on political affairs was sought by his sovereign. He was an enthusiastic patron of the turf from early life, and his stud at Newmarket was of princely dimensions. Of late years, he devoted himself to the happiness of his tenantry and the comfort of the labourers on his extensive estates. He died May 14, 1861, and was succeeded by his only son —

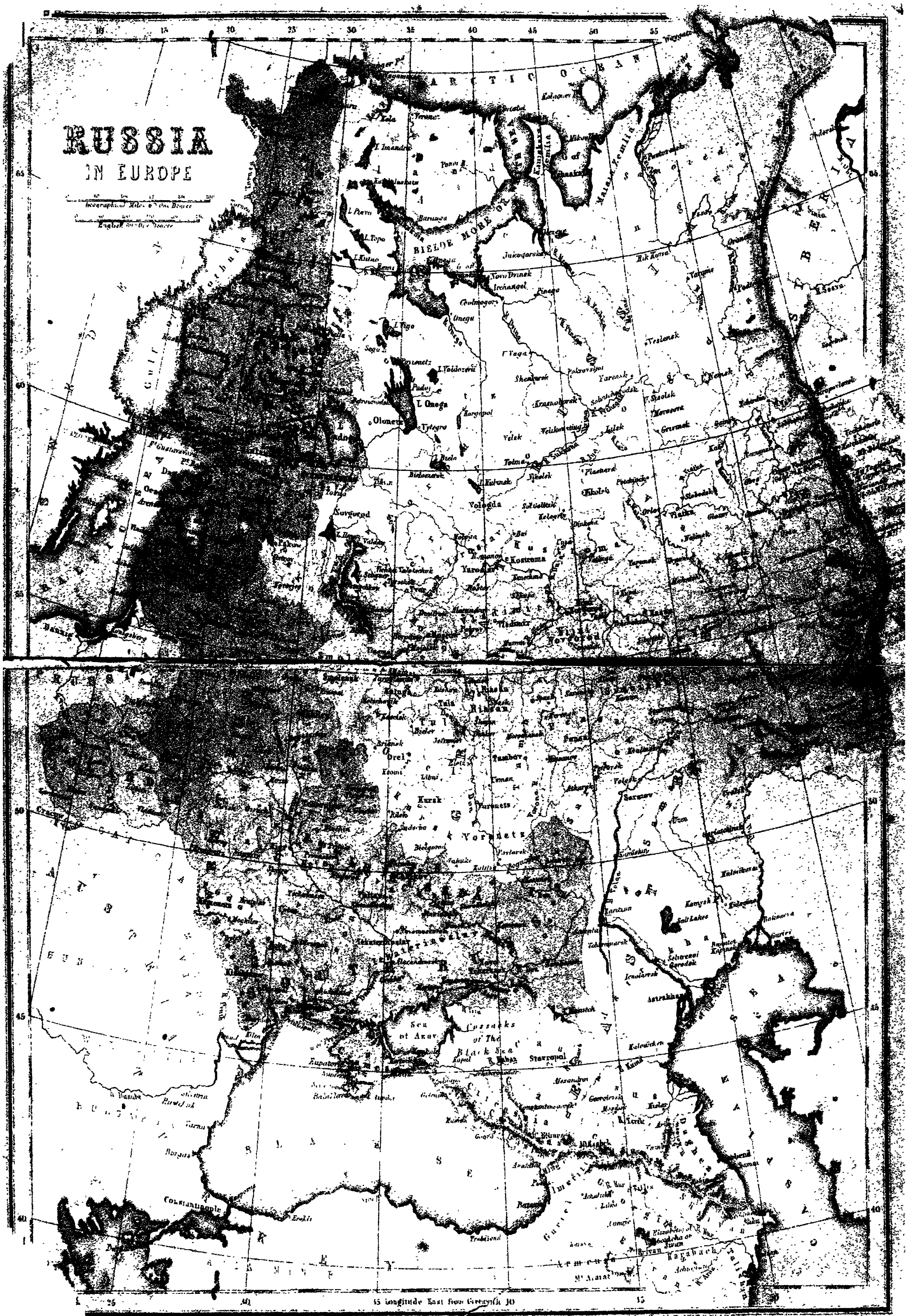
FRANCIS, eighth duke, born in 1809. He was M.P. for Tavistock from 1832 to 1841, but is most retired in his habits, and takes no active part in political affairs. The heir-presumptive to the honours and representation of the House of R. is the Hon. Colonel Francis C. H. Russell, M.P., born 1819, eldest son of the late Major-general Lord George W. Russell, second son of John, sixth duke.

The Dukes of Bedford have a magnificent mansion and park at Woburn, a few miles from Bedford.

RUSSELL, JOHN RUSSELL, EARL, K.G., English minister and statesman, third son of the sixth Duke of Bedford, was born in Hertford Street, Mayfair, London, August 18, 1792, educated at Westminster School, whence he was sent to Edinburgh, at that time preferred to the English universities by the great Whig families. Here he pursued his studies with industry and success, under the care of Professor Dugald Stewart; and here, at the meetings of the Speculative Society, he first exercised his powers of debate. In 1809, he proceeded on a continental tour, and France being closed against English travellers, he directed his steps to Portugal and Spain. In 1821 appeared his *History of the British Constitution*, and in 1824, *Memoirs of the Affairs of Europe from the Peace of*

Utrecht. In more recent years he has given to the world, from the family archives, the *Correspondence of John, fourth Duke of Bedford*, which throws much light on the secret history of the early part of George III.'s reign; the *Life, Diary, and Letters of Thomas Moore*, in pursuance of a promise made to the poet several years before; the *Correspondence of Charles James Fox*, and the first volume of the *Life and Times* of that great Whig statesman. Having now noticed his career as an author, we may briefly pass in review his long, honourable, and consistent career as a politician. In 1813, he was elected for the family borough of Tavistock, and vigorously but vainly opposed the repeal of the Habeas Corpus Act in 1817. He made his first motion in favour of parliamentary reform in 1819, and continued to bring the subject almost annually before the Lower House, until he stood forward as a minister of the crown to propose the great measure of 1831. He was also the strenuous advocate of the repeal of the Test and Corporation Acts, Roman Catholic Emancipation, and other measures of civil and religious liberty. In 1828, he carried by a large majority his motion for the repeal of the Test and Corporation Acts, although it was opposed by the Duke of Wellington's government. In 1829, he supported the Catholic Emancipation Bill. At the general election of 1830, caused by the death of George IV., the rallying cry of Parliamentary Reform sent many additional Liberals into the House of Commons. The 'Great Duke' was driven from office; and Earl Grey being appointed prime minister, proceeded to form a cabinet pledged to peace, retrenchment, and reform. R. did not receive a seat in the cabinet, but he was appointed to the lucrative office of Paymaster of the Forces, and was one of the four members of the government to whom Earl Grey intrusted the task of framing the draft of the first Reform Bill. The great and imperishable honour next devolved upon R. of proposing the bill (March 1, 1831). The fortunes of the measure belong to the history of the time; suffice it to say, that on the 4th of June 1832, the bill obtained the royal assent, and that the country was saved from the throes of revolution and civil war, which at one period appeared imminent. R. left office with the Melbourne government (which had succeeded to that of Earl Grey) in November 1834. In March 1835, he brought forward a motion in favour of taking into consideration the temporalities of the Irish Church. It was opposed by the government, but after three nights' debate, was carried by 322 votes against 289. On the 4th April, he carried a resolution in committee in favour of appropriating any surplus which might remain, after fully providing for the spiritual wants of the members of the Irish Church, to the general education of all classes of Christians. The report of the committee having been affirmed by the whole House, the government of Sir Robert Peel was dissolved, and that of Lord Melbourne restored. R. now became Home Secretary, with a seat in the cabinet. On the 5th of June 1835, he brought in an important bill for the reform of the municipalities of England and Wales, which was carried after some mutilation, and secured an effective reform of municipal institutions. Next session, he proposed and carried the government plan for the commutation of tithes in England. Also a bill for a general registration of marriages, births, and deaths, the value of which, in social and statistical inquiries, can scarcely be overrated; and a bill for the amendment of the marriage laws, which enabled dissenters to be married in their own chapels. He likewise passed an English Church Reform Bill, making a new distribution of episcopal dioceses and incomes. In 1837, he carried a series of bills for further amending the criminal law, by which capital punishment was finally removed from forgery and all offences except seven. An Irish Tithe Bill was also passed, but the 'appropriation clause' being always rejected by the Lords, R. was obliged to accept the bill divested of the clause. He exchanged the seals of the Home for those of the Colonial Office, when the Canadians broke into rebellion in 1839, and sent over Lord Durham, who recognised the right of the Canadians to self-government; and who, with his successor, Lord Sydenham, brought the Canadas into loyal and harmonious relations with the mother-country, which have never since been disturbed.

In 1841, R. proposed a fixed duty of 8*s*. per quarter on foreign corn, and a reduction of the duties on sugar and timber. Being defeated by the opposition, the Melbourne government appealed to the country without success; and R. and his colleagues made way for the administration of Peel. In this general election, he challenged the verdict of the city of London upon the free-trade measures of the government, by boldly leaving Stroud, and standing for the city. He was elected by the narrow majority of nine votes, and continued to represent the city until his elevation to the peerage. In November 1845, R. wrote a letter from Edinburgh to the electors of the city of London, announcing his conversion to the total and immediate repeal of the corn laws. This letter led to the resignation of the Peel cabinet; and R. was commissioned by the Queen (December 11, 1845) to form an administration, which at first he failed to do through the antipathy of Earl Grey to Lord Palmerston, and Sir Robert Peel being recalled to power, had the honour of carrying the repeal of the corn-laws. His Irish Coercion Bill, however, being defeated by the combined Whigs and Protectionists, he resigned; and R. became nominally what he had been really during the greater part of the Melbourne administration—prime minister. In 1846, a series of assassinations in Ireland compelled him to propose a more stringent coercion act than that of the previous session. In 1847, he had to deal with the Irish famine; and in 1848, with a miniature Irish rebellion. The papal bull, parcelling England into dioceses, extorted from R. an indignant protest, first in the form of a letter to the Bishop of Durham, and next in the Ecclesiastical Titles Bill of 1851, prohibiting the assumption of territorial titles by Roman Catholic prelates. R.'s advice to the Queen to dismiss her Foreign Secretary and his ancient colleague, Lord Palmerston, for communicating, without consultation with his colleagues, his approval of the French *coup d'état*, precipitated the downfall of the R. administration, and in February 1852 he ceased to be First Lord of the Treasury. Lord Derby made an unsuccessful attempt to carry on the government; and in the succeeding cabinet of the Earl of Aberdeen, R. consented, December 1852, to fill the post of Foreign Secretary with the leadership of the House of Commons. In the session of 1854, he brought forward a new Reform Bill, but was most reluctantly compelled to resign it in consequence of the Crimean War. He was next appointed Commissioner to the Congress of Vienna, and incurred so much unpopularity by recommending terms of peace, and a plan of counterpoise suggested by Austria, that he was forced by the pressure of unfavourable opinion to leave the ministry (July 1855). He voted against the government on Mr Cobden's motion against Lord Palmerston's Chinese policy, which led to a dissolution. When the second administration of Lord Palmerston



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was formed (June 1859), R. became for the second time Foreign Secretary, which office he still (1865) holds. He threw the moral influence of his name and the nation he represented into the scale of Italian unity and independence. He uttered warnings and remonstrances against the annexation of Savoy and Nice by France, which gave great offence to the government of the Emperor Napoleon by their frankness and candour. He ably preserved British neutrality in the civil war between the Federal and Confederate States of America. He wrote spirited dispatches expressive of the indignation with which the British government regarded the despotic acts of Russia in Poland; but he incurred many reproaches from the Poles and their sympathisers in France and England, for withdrawing from the Austrian and French alliance when war with Russia appeared imminent. More recently, he took an active but not a successful part in the Slesvig-Holstein dispute, which the peculiar policy of the French emperor brought to nothing. R. has always taken a prominent part in promoting the education of the people, and, with the assistance of Lord Lansdowne, laid the foundation of the present system of national education, supported by parliamentary grants, and administered by the Committee of Privy Council for Education. He brought forward for many years a measure admitting the Jews to parliament, which passed in 1858 upon a compromise suggested by the Earl of Lucan. But the question with which he has ever been identified in the public mind is parliamentary reform. He brought in a Reform bill in 1852, a second in 1854; moved the resolution which procured the condemnation of the Derby Reform Bill in 1859, and in 1860, brought in another government bill, which failed to pass. In 1861, he was called to the Upper House, and exchanged the courtesy title of 'Lord John,' by which he had been so long known, for that of Earl Russell. His language is simple, clear, plain, and terse, yet pregnant with meaning. Upon great constitutional questions and historical precedents, he is perhaps the greatest living authority; and upon such high themes, his speeches rise to a high order of eloquence. He is an admirable and fearless debater, and his tact, skill, and self-reliance have often enabled him to fight, almost unaided, a not unequal battle against the greatest parliamentary ora e. His voice is often weak, his delivery somewhat hesitating, mincing, and affected, and his action has little variety. A certain coldness of temper has always chilled the personal enthusiasm of his followers. His indomitable self-reliance and tenacity of self-assertion were sarcastically painted by the Rev. Sydney Smith, who called him the 'Lycurgus of the House,' and said that he was 'utterly devoid of all moral fear.' He married, 1835, the daughter of Thomas Lister, and relict of Lord Ribblesdale (she died in 1838); and 2dly, in 18 , the second daughter of the second Earl of Minto.

RU'SSIA, Empire of, extending over a large proportion of the northern regions of the globe, includes the eastern part of Europe, the north of Asia, and the north-west extremity of North America. Lat. 38° 30′–78° N.; long. 17° 19 E.–130° 10′ W. It is bounded on the N. by the Arctic Ocean; on the E. by the Pacific Ocean and the British-American possessions; on the S. by the Chinese empire, Turkestan, Caspian Sea, Persia, Asiatic and European Turkey, and the Black Sea; and on the W. by Austria, Prussia, the Baltic, and Sweden. Its length from west to east, from the Prosna, on the Prussian frontier, to Mount St Elias in America, is about 9800 miles; its breadth from north to south is about 2667 miles. Its circumference is estimated at 30,333 miles, of which 21,000 miles are in coast-line. The area, exclusive of the American colonies, is stated at 7,846,747 sq. m.; pop. more than 74,000,000. The following table gives the names, the areas, and the populations of the 50 provinces of European Russia, and of the grand duchy of Finland, the kingdom of Poland, and of the territories of the Caucasus and of Siberia:

Name of Province.	Area in Eng. Square Miles.	Population in 1862.
1. Archangel,	340,704	274,951
2. Astrakhan,	84,939	477,492
3. Bessarabia,	13 476	919,107
4. Courland,	10,513	567,078
5. Don Cossacks, territory of,	59,032	896,870
6. Ekaterinoslav,	26,049	1,042,681
7. Esthonia,	7,623	303,478
8. Grodno,	14,695	881,881
9. Jaroslav,	13,231	976,806
10. Kalouga,	11,926	1,007,471
11. Kazan,	23,762	1 543,344
12. Kharkov,	21,231	1,582,571
13. Kherson,	27,773	1,027,459
14. Kiev,	19,654	1,944 334
15. Kostroma,	30 850	1,076,988
16. Koursk,	17,431	1,811,972
17. Kovno,	15,713	988,287
18. Livonia,	18,773	883,681
19. Minsk,	34,462	986,471
20. Mogilev,	18,449	884,640
21. Moscow,	12,792	1,599,808
22. Nijni-Novgorod,	19,030	1,259,606
23. Novgorod,	45,475	975,201
24. Olonetz,	57,768	287,354
25. Orenburg,	147 062	2,030,583
26. Orel,	18,264	1,532 034
27. Penza,	14 644	1,188,535
28. Perm,	128,625	2,046,572
29. Podolsk,	16,386	1,748,466
30. Poltava,	19,194	1,819 110
31. Pskov,	17,350	706 462
32. Riazan,	16 214	1,427,293
33. St Petersburg,	17,298	1 083,091
34. Samara,	61,042	1,530,039
35. Saratov,	31,599	1,636 135
36. Simbirsk,	18,776	1,140 973
37. Smolensk,	21,615	1,102,076
38. Stavropol, with the territory of the Cossacks of the Black Sea,	52,502	761,810
39. Tambov,	25,556	1,910,754
40. Taurida,	24,665	687,343
41. Tchernigov,	20 230	1,471,866
42. Tula,	11,844	1,172,249
43. Tver,	21,727	1,491,427
44. Viatka,	55,386	2,123,904
45. Vilna,	16 321	876,116
46. Vitebsk,	17,447	781,741
47. Vladimir,	18,295	1,207,908
48. Volhynia,	27,335	1,528,828
49. Vologda,	153 090	951,593
50. Voronesh,	25,737	1,930,859
Total Russia in Europe,	1,948,327	60,095,858
Grand Duchy of Finland,	146,056	1,636,549
Kingdom of Poland,	47,983	4,764,416
Caucasus,	118 396	3,543,710
Siberia,	5,585,965	4,230,938
Whole Empire (not including the American colonies),	7,846,747	74,271,501

The Russian Sea-bord.—The northern shores of the Russian territories, which are washed by the Arctic Ocean, are deeply indented. The White Sea (q. v.), an immense arm of the Arctic Ocean, penetrates 350 miles into the mainland, and is subdivided into the gulfs of Onega and Archangel or Dwina. The other chief inlets on the north of R. are the Kara Sea and the gulfs of Obi and Yenisei. Westward from Nova Zemla (usually, but less correctly, spelled Zembla), the Arctic Ocean is navigable for three months of the year; east from that island, the sea, even at the mildest season, is encumbered with floating icebergs. The chief islands in this ocean are the Kolguef, Waigatz, Nova Zemla, and Spitzbergen Isles. The eastern shores of R. are washed by the Pacific, subdivided

into the Behring, Okhotsk, and Japan Seas; and the islands belonging to this country in these seas are Sakhalin, and the Kurile, Aleutian, and Kadjak Isles. On the south are the Black Sea (q. v.) and the Sea of Azov (q. v.), the latter communicating with the former by the Strait of Kertch, and so shallow that it is navigable for small craft only. Of the Caspian Sea, R. commands the whole, with the exception of the south shore, which belongs to Persia. The northern and eastern banks of the Caspian are the seats of the chief fisheries of the empire. On the north-west of R. are the Baltic Sea, with the gulfs of Riga, Finland, and Bothnia; and in these waters, the islands of Aland, Esel, and Dago belong to the empire. The freezing of the water near the shores of the Baltic renders the navigation of this sea impracticable during five months of the year, although a few ports are accessible throughout the whole year. Possessing means of easy communication with the most fertile governments of the interior, and sustaining chiefly the commerce of the Russian empire with the other parts of Europe and with America, the Baltic is of the highest commercial importance.

Surface, Hydrography, and Soil.—European Russia consists of a vast plain bordered with mountains. On the east are the Ural Mountains (q. v.), forming a broad range of no great elevation, ending on the north on the shores of the Arctic Ocean, and on the south in a range of elevated plains on the left bank of the Volga. On the south-east of the great plain is the lofty range of the Caucasus (q. v.), crossed by the Pass of Derbend and the so-called Military Georgian Road. The Crimean Mountains, a continuation of the Caucasian chain, rise to 5000 feet in their highest summit. The districts in the south-west of R., between the Vistula and the Pruth, are covered by hilly ranges from the Carpathian Mountains (q. v.), which in Poland are known as the Sandomir Mountains. The Finland Mountains, on the north-west, are ranges of granite rocks, embracing numerous lakes, and not rising higher than 600 feet. The Alaunsky table-land, which connects itself with the Ural Mountains by a chain of hills in latitude about 62° N., is the key to the configuration of European Russia. From this table-land, with an elevation of about 1200 feet, the country, with gradually declining slopes, falls away in four directions—north to the Arctic, north-west to the Baltic, south to the Black, and south-east to the Caspian Seas. The sloping country on the north of the Alaunsky heights is called, from its eastern and western limits, the Ural-Baltic table-land; that on the south of the same dividing heights is called, for the same reason, the Ural-Carpathian table-land. The Alaunsky heights form the great water-shed, and regulate the course of all the great rivers of the Russian empire. To the north, they throw off the Petchora, the Northern Dwina, and the Onega; to the south, the Dniester, Bug, Dnieper, Don, and Kouban; to the south-east, the Volga, with its great affluents the Oka and Kama. The Western Dwina, the Niemen, and the Vistula, fall into the Baltic Sea. The important rivers of R. receive separate notice under their own names. At the foot of the north-west slope from the central terrace, is the lake-country of European Russia, and the great lakes (which are noticed separately) are Ladoga, Onega, Ilmen, Peipus, and Pskov. The plain of European Russia naturally divides itself into three tracts or zones, each of which differs from the others in the nature and quality of its soil. The northern zone extends between the Arctic Ocean and the Ural-Baltic table-land, the middle zone between the Ural-Baltic and the Ural-Carpathian table-lands, and the southern zone between the Ural-Carpathian table-land and the Black and Caspian Seas. The soil of the northern zone is marshy, and the climate inclement. In its middle part, between the rivers Onega and Mezen, and especially along the banks of the Northern Dwina, forests of fir-wood and large tracts of fodder-grass occur. Toward the east of this tract, the woods disappear, and vast marshes, frozen the greater part of the year, cover the country. The middle zone reaches south-west to the government of Volhynia and the south of Poland, and north-east to the Ural Mountains. In the west, it consists of an extensive hollow, covered with woods and with marshes, the chief of which are those of Pinsk (q. v.). In the middle part of this zone, the soil is partly heavy and covered with mould, and toward the north, sandy. Beyond the Oka, luxuriant meadows abound; and on the east, beyond the Volga, this tract forms an extensive valley, covered with a thick layer of mould, abounding in woods, and rising into hills in the vicinity of the Ural range. The southern zone consists of steppes extending along the shores of the Black and Caspian Seas. The steppes of the Black Sea have mostly a mouldy soil, covered with grass; but in the south-east, shifting sands and salt marshes predominate. The steppes of the Caspian consist of sand, salt marshes, and salt lakes—the Elton lake, yielding nearly 4,000,000 puds (about 1,290,000 hundredweights) of salt annually, being the most remarkable.

Constitution and Administration.—The government is an unlimited monarchy, the head of which is the emperor, who unites in himself every authority and power—that is to say, is the head of the military, the legislative, and the judicial systems, and is also the ecclesiastical chief of the orthodox Greek Church. The order of succession is by primogeniture, hereditary in heirs-male, and in females in default of males. Every military or civil officer of the crown is required to take an oath of allegiance. The expenses of the imperial palace amount to about £1,200,000 annually; the crown appanages, constituting the private property of the imperial family, yield an annual revenue of £700,000. The council of state is the highest branch of the executive, and comprehends the legislative, judicial, and administrative powers. The president and members—among whom are always included the ministers of the crown—are appointed by the emperor. A secretary of state, whose duty it is to report the opinion of the council to the emperor, is attached to this body. The estimates of expenditure and income, and every proposition introducing an addition to, or a modification of, the laws, is considered and revised by this council, which, for the more orderly discharge of its functions, is divided into four sections: 1. Law; 2. Civil and Ecclesiastical; 3. Finance; 4. Army and Navy. After the council of state, the next most important arm of government is the committee of ministers, which is the highest administrative body. The state secretaries for the kingdom of Poland and the grand-duchy of Finland serve as representatives of local administration at St Petersburg. The senate, the highest judicial body, is composed of two sections, one of which discharges its duties at St Petersburg, the other at Moscow. There are 12 imperial ministers, who have under their management the following departments: The Court; War; Admiralty; Treasury, which includes Commerce and Industry; Public Instruction; Interior; Foreign Affairs; Justice; Crown Domains; Public Works; Post-office; and Board of Control. Except the departments of Foreign Affairs and the Imperial Court, all these branches of the central administration are

represented in the provinces. European Russia is divided into 50 provinces, over each of which is a governor, appointed by the emperor, and who is the head of the civil administration of the province or government. Some provinces, although administered by governors, are united under the superintendence of a governor-general. This arrangement is rendered necessary owing to the immense extent of the empire, and the governor-generalships are generally remote frontier regions. At the present time (April 1865), reforms are in progress throughout all the various branches of the government. Reforms in the municipal and rural administration of the provinces, which give increase of self-government, are already in operation. Several important legal reforms—indeed, an entirely new legal system, incorporating oral testimony and trial by jury, with the present system of Russian jurisprudence, and opening the business of the courts to the public eye—were laid before the public in a published form in 1864, and are now being carried out. By the Russian law, capital punishments are only inflicted for high-treason or *lèse-majesté*. Corporal punishment by the Knout (q. v.) was abolished in 1863. The severest punishments inflicted for violations of the law are labour in the galleys, in the public works, deportation to the mines of Siberia, &c. There are prisons in every town throughout the empire, but the prison-system is still primitive, rude, and ill-administered. In 1862, 82,449 persons were condemned by the several courts of justice to different degrees of punishment for various crimes, and about 9000 persons were convicted by the military and naval courts for offences against the laws and discipline of these services.

Distinctive Rank of Classes.—The nobility occupy the highest place in the social scale, enjoy many special privileges, such as freedom from conscription and poll-tax, and form in every province a separate body, headed by a marshal, chosen by and from themselves. Functionaries, officials, artists, and clergy possess almost as many privileges as the nobility. The next class is that of the merchants. The burghers and peasants constitute the lowest class, and are subject to claims of service and to personal taxation. Each class enjoys, to a certain extent, the right of self-administration in its own affairs. Each apportions its taxes, and chooses some of its own functionaries. The recent emancipation gave freedom to 20,000,000 peasants or serfs, who, prior to the year 1861, being governed exclusively by their owners, enjoyed very limited civil rights. Communal government is the fundamental principle of all the rights of the peasant class. In general, the lands allotted to the peasants are not their individual property, but belong to the commune, and are shared among all its members.

Revenue and Expenditure.—The following table shews the amount, and the details of the revenue and expenditure for the year 1864:

REVENUE.

1. Direct Taxes, including Poll-tax, which amounts to £5,961,239,	£7,566,572
2. Indirect Taxes—	
(a.) Spirits,	21,300,859
(b.) Salt,	1,639,829
(c.) Tobacco,	668,701
(d.) Beet-root Sugar,	96,500
(e.) Customs,	5,945,300
(f.) Stamps,	2,219,830
3. Royalties,	2,446,072
4. Crown-lands and other Properties,	8,871,912
5. Money received from Caucasus,	575,607
6 Miscellaneous,	6,375,786
Total,	£57,706,968

EXPENDITURE.

1. Interests and Management of the Public Debt,	£9,939,634
2. Council of State and Imperial Chanceries,	900,576
3. Synod and Churches,	890,324
4. Imperial Court,	1,292,574
5. Foreign Affairs,	349,010
6. War Department,	19,991,784
7. Navy,	3,614,056
8. Treasury,	9,741,145
9. Department of Crown Domains,	1,648,891
10. Department of Interior,	2,020,927
11. Public Instruction,	1,040,670
12. Public Works,	4,193,796
13. Post-office,	1,895,723
14. Justice,	1,081,611
15. Board of Control,	54,376
16. Caucasus,	602,730
17. Extraordinary Expenses of the Army and Navy,	6,230,165
Total,	£64,787,990

If we deduct from the revenue £666,667 for arrears, we find that the expenditure exceeds the income by a very large amount, and this state of the balance has existed for several years. The difference was covered by foreign loans and the issue of paper-money. By an examination of the above tables, we perceive that the largest items of revenue are derived from spirits, crown-estates, and direct taxes; and that the war department and interest of debts are the most onerous items in the expenditure. Besides the items of revenue quoted above, there are many other comparatively light municipal taxes, levied for local purposes.

National Debt.—The national debt must be regarded as divided into two parts, one of which represents the loans made abroad, and the other the loans made at home. There are 18 foreign loans, the first of which was contracted in 1798; and the last, the 5 per cent. English and Dutch Loan, in 1864. In 1865, the foreign debts amounted to £79,234,693, and the home debts to £99,900,455, on which interest is payable. There is also paper-money to the amount of £105,204,095 in circulation.

Army.—The institution of a standing army took place in R. towards the close of the 17th c. under Peter the Great. Before that time, military levies were raised for longer or shorter periods, to suit the exigences of the moment; although a small permanent force was in existence from very early times. The strength of the army is now maintained by conscription under imperial ukase, and the conscripts are taken from the class of peasants or burghers who are liable to the poll-tax. The drafts for recruits vary from 2 to 12 per thousand; and the men drawn for service are taken either by ballot among those of equal ages, or by a claim on those families in which the number of male children is greatest. According to Russian law, the age of the recruits is from 21 to 30, the standard height is 5 feet 1 inch, and the term of service is 15 years, although during the time of peace the strength of the service is considerably diminished by *congés* (furloughs), which are allowed to the men, who, however, are required to return to their service when called upon. A plan is now ripe for embodying fresh levies, and increasing the number of *congés*, in order to secure a larger force, which would prove immediately available in the event of war. On the 1st January 1863, the standing army, including the guard, consisted of 31,110 generals, staff, and commissioned officers, and 818,105 privates and non-commissioned officers. This force is divided into 608 battalions of infantry, 313 squadrons of cavalry, and 182 batteries of artillery. Besides this establishment, there were 300,000 irregular troops, consisting of Cossacks, Kirghiz, Circassians, and other contingents, who are liable to military

service in lieu of paying taxes. Of the irregular troops, only 80,000 serve in time of peace under the Russian eagles. The military establishment of the empire was maintained, in 1862—1863, at the expense of £19,202,861. By imperial ukase, issued in 1864, the military regulations were changed, the old system was abolished, and that now existing in the French military service adopted, and the whole empire divided into ten military districts.

Navy.—The Russian boundaries were first advanced to the sea under Peter the Great, and from the genius of that monarch the Russian navy sprang. Besides the naval dépôts on the Baltic, the Black, and the Caspian Seas, there are also naval establishments on the shores of the North Pacific and on the Amur. Official returns for the year 1864 state that the Russian navy numbered 670 vessels, carrying 1920 guns, and manned by 45,000 seamen, levied by conscription, and serving under the same regulations as prevail in the army. Of the vessels, 211 were steamers, and 17 were iron-clads.

Religion and Churches.—Toleration of all religions which do not violate public morality or good order, exists in R., and not to profess the orthodox Greek faith, the national religion, does not disqualify for the enjoyment of any civil rights. The law does not allow those who already belong to the established faith to secede from it; and if, in a household, either of the parents be a member of the Greek Church, all the children must be brought up within that communion. The emperor is head of the church, the affairs of which he directs by means of a synod composed of the chief prelates, who are summoned from their dioceses to attend its meetings (see RUSSIAN CHURCH). The direction and regulation of all other religious communities emanates from a department in the offices of the Minister of the Interior. In 1858, there were in R., exclusive of Finland and Poland, of orthodox Greeks, 53,763,471; Schismatics, 853,282; Armenian Greeks, 33,937; Roman and Armenian Catholics, 2,818,914; Protestants, 1,959,334; Jews, 1,447,479; Mohammedans, 5,316,455; and Idolaters, 478,343. In 1861, there were 614 orthodox convents, 137 of which were occupied by women. There were 5648 monks, and 4879 lay-brothers; 2931 nuns, and 7669 lay-sisters; 50,394 priests and deacons, and 63,421 other persons, who were employed in religious services in the 50,165 orthodox churches. For the education of the clergy, there are 4 academies, 50 seminaries, and 201 schools, in which 54,000 persons are trained. The churches, convents, and the ecclesiastical departments in general, are maintained by government.

Public Instruction.—The department of public instruction in R. is presided over by a ministry, although many of the schools are directed by other departments. The greater number of these establishments are supported out of the imperial treasury. There are six universities in the empire—namely, in St Petersburg, Moscow, Dorpat, Kiev, Kharkov, Kazan; and two are (1865) in course of erection in Odessa and Warsaw. Of the students—who do not reside within the universities—the poorest are allowed stipends for their maintenance, and the candidates for admission as students must have passed satisfactory examinations in the courses of instruction gone through at the gymnasia. Degrees are conferred in law, medicine, philology, mathematics, natural history, and the oriental languages. Degrees in theology are granted at Dorpat to students of the Lutheran faith. The professors are appointed and paid by the government. Four institutions, the law school and lyceums of St Petersburg, Nijni, and Jaroslav, are specially devoted to legal science. The gymnasia, schools of the second class, about 100 in number, are found in the provincial towns. Besides the universities and gymnasia, there are numerous district schools; but the means of instruction, though rapidly increasing, are very insufficient. In 1853, there were only 3000 village schools; in 1863, the number had increased to 34,075. There are also numerous special schools for instruction in mining, in woodcraft, civil engineering, navigation, &c. The military schools form a separate system. The cadets are transferred from the military gymnasia to the 'military schools,' in which they qualify to fill the posts of commissioned officers. Three academies, for the staff, the engineers, and the artillery, are devoted to the higher branches of military science. Theological education for the orthodox church is superintended by the clergy. Official tables for 1862 state that the number of schools in R. was 56,999, attended by 1,325,810 pupils, male and female.

Literary and Scientific Institutions, Museums, Press, &c.—Many of the most important institutions in R., as the Academy of Sciences and the Pulkova Observatory, flourish in or near St Petersburg (q. v.). There are, however, throughout the empire numerous institutions and societies for the promotion of the arts and sciences. The Imperial Library at St Petersburg, with upwards of a million volumes, is one of the finest in the world. The press of R., not yet much developed, is subject to special censorship, which, though rigorously exercised under the reign of Nicholas I., is now, under the milder government of Alexander II., considerably less strict. Each year gives evident proof of the rapidly increasing taste for literature and mental culture in Russia. In 1858, 1577 original works, and 284 translations, were printed in R.; and in 1857, 1,613,862 volumes were imported. In 1860, there were 310 periodicals, 142 of which issued from the metropolitan press.

Charitable Institutions are for the most part supported by government; and although their number is increasing annually, the scarcity of large national institutions—especially public hospitals—is painfully felt. Medical assistance can only be obtained in the provinces with the greatest difficulty, owing to the distances of the towns and the sparseness of the population. The foundling hospitals of St Petersburg and Moscow receive annually about 15,000 abandoned infants and orphans.

Public Roads and Canals.—The want of good roads and ready means of communication are particularly felt in R., where the distances are so great, and the population so scanty. To keep the roads in repair, is a work of the greatest difficulty here, for two reasons—the first, a difficulty in concentrating a sufficient amount of labour where the labourers are so few, and so widely dispersed; and the other, the melting of the snows and overflowing of the rivers in spring. During four or five months of the year, the soil is thickly covered with snow, which, when it becomes hardened by the frost, offers an excellent, an easy, and a universal means of transit. On the return of mild weather, however, the snow melting, sinks into and softens the earth, which is also overflowed by the rivers. The roads being thus flooded, are rendered almost wholly impassable for traffic till the soil dries. In autumn, the usual rains fall, and the earth is again soaked, so that the time for easy communication during summer is very short. Upwards of 1900 miles of railway have been constructed, and are in operation in R., and three new lines of railway are (1865) in process of construction. St Petersburg and Moscow are connected with several of the large provincial towns—the most remote of which are Kharkov, Kiev, Warsaw, Riga,

and Nijni-Novgorod—by macadamised causeways, which are now generally kept in good repair. The other towns are connected by ordinary track-roads, which are generally impracticable in spring and autumn. Owing to the generally bad character of the surface, and to the abundance of the rivers which traverse it, the water-communications of this empire are very important as commercial highways, though the vast transit-trade of the country is not confined to them alone. The transport of merchandise across the broad expanse of the empire, is much facilitated by canals, which have here become an important and a peculiar institution. The four seas surrounding European Russia are connected by canals: 1. The Caspian is connected with the White Sea by the canal of the Prince of Wirtemberg, between the river Scheksna, an affluent of the Volga, and the upper waters of the Northern Dwina. 2. The Caspian and Baltic are connected by three systems of canals. See VOLGA. 3. The Black Sea is connected with the Baltic by three lines of canals—those of Beresina, Oginsky and Dnieper, and Bug, between the affluents of the Dnieper and those of the Western Dwina, Niemen and Vistula.

Postal Service.—This service was inaugurated in 1664. In 1843, the government instituted a uniform tax of about 3*d.* for the transmission of a letter under half an ounce in weight to any part of the empire. In 1863, the number of letters conveyed by the Russian post was 18,824,383.

Electric Telegraph.—Notwithstanding the immense extent of the surface of R., and the distance from each other of its principal towns, these are now nearly all united by lines of electric telegraph. At present (April 1865), 38,861 miles of telegraphic wires have been laid by government. A very interesting project is at present under discussion, by which it is intended to unite the town of Irkutsk in East Siberia, already in communication by telegraph with St Petersburg, to America by the projected telegraphic line on the other shore of the Pacific, and by a submarine wire, crossing at Behring Strait.

Population.—The population of the empire is spread with great irregularity over the surface. In European Russia, its average is less than 31 per Eng. sq. m.; in the Caucasus, more than 31; in Siberia, ¾; in Poland, 101; and in Finland, 11 per Eng. sq. mile. These figures, however, cannot be taken as a correct illustration of the actual distribution of the masses over the enormous surface of the country; for, upon comparison, the degree of the density of the population of European Russia is found to vary greatly in the different governments. The government of Moscow contains 166 inhabitants per Eng. sq. m.; while that of Archangel contains only ¾. The central and south-west governments of this part of the empire are the most densely peopled. The town residents are 9¼ per cent. of the whole population of European Russia; 7¼ per cent. of that of the Caucasus; and 5 per cent. of that of Siberia. Russian society is divided into five classes, and of these the nobility forms 1·49 per cent.; the clergy (including their families) 1·01 per cent.; the burgesses (tiers etat), 8·60; the peasants, 82·55; and the military, 6·35 per cent. Irrespective of Asiatic and American Russia, we find that in Europe this empire comprises a greater variety of races than any other European state. It is not, however, like Austria, a composite community, speaking various idioms, and having different physical characteristics and political interests. In European Russia, the predominant race is the Slavonian, and the Russian 'element' and language prevail almost universally. The 50,500,000 Russians who inhabit Europe are divisible into—1. Great Russians (33,935,000), inhabiting Central Russia. 2. Little Russians (12,015,000), located in the south-west. To the latter may be added the Cossacks (1,600,000), who are spread along the rivers Don, Kouban, Terek, Ural, Tobol, the Lake of Baikal, and the Amur. 3. White Russians (2,950,000), in the western provinces. The other Slavonic races are Poles (4,640,000), in the kingdom of Poland, and partly in the west provinces (where they form only 10⅞ths per cent. of the population); Servians and Bulgarians in Bessarabia and New Russia. The Finnish race (3,800,000), which occupies, under different names, the north and north-east of European Russia, and the north-west of Siberia, has in great part adopted Russian language and manners. The Lithuanians and Letts (2,460,000) dwell mostly between the Niemen and Dwina. The Turkish Tartarian race (5,700,000), in the south-east, and partly in Siberia, comprises Tchuvashes, Tartars of Kazan, Kirghiz, &c. The Mongols (376,000), comprising Kalmucks and other races in the south-east of European Russia, and in the east of Siberia. Besides these races, there are Roumains and Walachs (770,000), in Bessarabia and New Russia; Persians, Kurds, Armenians, &c. (460,000), near the Caspian Sea; Germans (920,000), distributed over the whole empire, but found in the greatest numbers in the Baltic provinces; Swedes (200,000), in Finland; Greeks (52,000), in the south; Bohemians—i. e., Gipsies (50,000)—chiefly in Bessarabia; Jews (2,014,000), mostly in Poland and the west provinces; Caucasians (1,830,000), Samoieds in the north of R., and many other tribes in East Siberia and Russian America.

Climate.—Owing to its vast extent, the Russian empire presents great varieties of climate. At Archangel, the mean temperature of the year is 32° F.; at Yalta, in the Crimea, 52°; and at Kutais, in the Caucasus, 58°. Consisting of an immense area of dry land, the climate of the empire is essentially continental; and the climate of localities in its interior is much more rigorous than that of places on the western shores of Europe in the same latitudes. The mean temperature of Edinburgh and Christiania is higher than that of Moscow and Kazan. The rigour of the climate of the empire increases not only with the latitude, but as you advance eastward; thus, the mean winter temperature of the town of Abo, on the Gulf of Bothnia, is the same as that of Astrakhan—viz., 23° F.; although the former is in lat. 61°, and the other in lat. 47°, or 14° nearer the equator. The difference of the mean summer temperature under the same latitudes is, on the contrary, not very considerable. The isothermal line of Astrakhan (60° F.) passes through Lublin in Poland and Ekaterinoslav. In the east, the maximum heat is even greater than in the west; and such heat-loving plants as the water-melon are grown more successfully in the south-east of R. than in the west of Europe, under the same latitude. The dryness of the atmosphere increases in the direction from north-west to south-east. On the banks of the Baltic, the average number of rainy and snowy days is 150, and the annual rainfall is 20 inches, while near the Caspian the number of such days is 70, and the rainfall only 4 inches. The climate of R. is in general healthy; but there are several places where diseases seem to be localised, as the shores of the Frozen Ocean, where scurvy is common, the marshes along the Niemen and Vistula, where the Plica Polonica (q. v.) is the chief disease, and the marshy lands on the Black, Azof, and Caspian seas, where ague always prevails.

Manufactures.—Manufacturing industry in R. may be said to date from the reign of Peter the

Great. With a view to its promotion, foreign manufactured goods are heavily taxed on importation. In 1863, the number of factories (exclusive of iron-works and all establishments engaged in the preparation of metals) was 15,453, which employed 465,000 hands, and produced articles amounting to 326,000,000 roubles. Of these factories, a half were in the governments of St Petersburg, Moscow, and Vladimir. The metallurgical works are mostly in the government of Perm, and in other eastern governments bordering on the Ural Mountains. Small handicraft manufacturing establishments abound in all the central governments, especially in the neighbourhood of Moscow, where whole villages during the winter season are employed in some special industry, as weaving, tanning, fur-dressing, joiners' work, shoemaking, &c. The chief manufacture is spinning and weaving flax and hemp. Linen is manufactured to the value of 100,000,000 roubles, chiefly in hand-looms; although the finer qualities are manufactured by power-looms, mostly in the governments of Jaroslav and Kostroma, and the capitals. Hemp is manufactured into sailcloth and ropes, which articles are largely exported. Woollen and worsted stuffs are made to the value of 50,000,000 roubles, and the quantity is on the increase. Fine cloths and mixed fabrics are made in the capitals, and in the governments of Livonia and Tchernigov. Silk-spinning and weaving are carried on in the factories of Moscow, which is renowned for its brocades, and gold and silver embroideries. Owing to the excessive taxation on imported cotton goods, cotton manufactories, employing a capital of 60,000,000 roubles, which might here be more profitably utilised, have been commenced within the last 25 years. After weaving, the next most important branch of industry is tanning, the products of which amount to 20,000,000 roubles. The other important branches of industry are cutlery, made in the town of Tula, the Russian Sheffield, and in the governments of Nijni-Novgorod, Vladimir, and Kostroma; and pottery and glass-works, the former carried on in the government of Moscow, the latter in that of Vladimir. Machine and chemical works are still in a backward state; the products of the former, in 1863, did not exceed 12,000,000 roubles; of the latter, 5,000,000 roubles.

Commerce.—The Russian empire, including provinces varying widely in their natural and industrial resources, presents an extensive field for internal commerce, while the abundance of its products maintains a vast foreign trade. Of the former, which is by far the more important, the extent and value cannot be given, owing to the want of statistical data. Moscow, in the centre of the industrial provinces of the empire, and the great dépôt for the wares that supply the trades of the interior, is the chief seat of the home-trade. The other large trading towns are chiefly those on the banks of the great rivers. The goods yearly conveyed by the Volga alone amount to 200,000,000 roubles. Owing to the distances between the great trading towns, fairs are still of great importance in Russia. The transactions of all the fairs in the empire amount to more than 300,000,000 roubles, and the chief are those of Nijni-Novgorod (q. v.), Irbit (q. v.), Kharkov (q. v.), Poltava (q. v.), and Kursk (q. v.).—The foreign trade consists mainly of the export of raw products, and the imports of colonial and manufactured goods. The foreign trade by sea is five times greater than the trade by land; and of the latter, the commercial transactions with Europe amount in value to ten times the Asiatic trade. One-third of the whole foreign commerce is transacted at St Petersburg, one-ninth at Odessa, and one-fifteenth at Riga. In 1863, 9893 vessels entered the ports, and of these, 1890 belonged to the Russian commercial marine, 2028 were English, 688 Dutch, 607 Swedish and Norwegian, 388 Prussian, 329 Danish, and 206 French. The following table gives a view of the chief articles of export and import for the years 1862 and 1863:

EXPORTS.

	1862. Roubles.	1863. Roubles.
Cereals,	53,504,262	44,201,913
Timber,	5,900,974	5,865,356
Leather,	427,619	177,149
Skins undressed,	474,517	704,135
Tallow,	9,827,830	9,731,000
Hemp,	9,326,704	8,049,146
Flax,	16,483,996	16,543,321
Iron,	1,238,491	534,158
Copper,	219,932	237,899
Sheep's wool,	18,829,428	14,427,099
Potass,	1,434,938	1,[illegible],129
Bristles,	2,498,981	3,124,181
Linseed and hemp-seed,	16,975,859	11,629,326

IMPORTS.

	1862. Roubles.	1863. Roubles.
Sugar,	6,149,239	10,950,301
Oil,	6,456,626	6,201,722
Tea and coffee,	13,304,181	13,838,181
Cotton,	5,183,576	9,375,933
Cotton-yarn,	1,310,019	1,386,741
Wool,	3,298,799	2,602,423
Silk (raw),	2,698,385	2,275,933
Iron (cast and wrought),	1,303,248	2,040,817
Wine and other liquors,	9,121,436	8,106,129
Dyes,	9,018,590	7,305,009
Fruit,	4,860,198	5,118,509
Machinery,	8,884,628	5,810,638
Cotton, silk, woollen, and linen stuffs,	11,867,841	9,342,118

The total exports amounted in 1862 to 167,120,971 roubles; in 1863, to 140,772,588 roubles; the total imports in 1862 to 127,995,283 roubles; in 1863, to 130,703,549 roubles—presenting a considerable surplus in favour of the exports. In the course of this century, the foreign trade has increased fourfold.

Geology and Mineral Products.—A more intimate knowledge of the geological structure of R. may be said to date from 1841, when the eminent geologist, Sir R. I. Murchison, undertook a scientific journey to R. and the Ural Mountains. His geological investigations, together with the palæontological researches of his colleagues, E. de Verneuil and Count Kayserling, have served as a basis for further surveys. The oldest stratified rocks are the Silurian, on the southern shores of the Gulf of Finland, sinking down below the Devonian strata, which run in two large branches—on the south-east to Voronesh, and on the north-west to Archangel, both overlaid to the east by a still more extensive deposit of carboniferous rocks. The immense triangle between those layers and the Ural is occupied by the Permian system (except the north-east extremity, which is covered by Jurassic beds), named by Sir R. I. Murchison from its development in the government of Perm. To the south of the south-east Devonian branch extend deposits of the cretaceous period, and detached patches of the carboniferous formation. The latter contains, in R., only the older members of the group up to the mountain limestone, which contains numerous but thin seams of coal, generally poor in quality. The field along the Donetz forms an exception, and yields annually about 96,400 tons (⅘ths of the total quantity raised in R.) of good coal and anthracite. The remaining south-west and south-east parts of the empire are covered by tertiary beds, more or less recent. The Ural Mountains present an outcrop of all the secondary and palæozoic formations down to the stratified gneiss and granite, which latter composes

nearly the whole province of Finland, and skirts the middle course of the Dnieper. The Ural Mountains (q. v.), which contain almost all the mineral riches of the country, are the principal seat of mining and metallurgic industry. They produce gold, platinum, copper, and iron of excellent quality, especially the last, which is manufactured from magnetic ore. Emeralds and jaspers, &c. are also found, as well as diamonds of an inferior quality. Gold, silver, copper, plumbago, &c. are also obtained from the Altai and Nerchinsk mines in Siberia (q. v.). In 1859, the whole produce of the mines amounted to £7,000,000; and of this large amount, the chief items were pure gold, 1467 puds (pud = 40 Russian pounds = 36 lbs. avoir.); silver, 1090 puds; platinum, 56 puds; copper, 320,000 puds; lead, 70,000 puds; cast-iron, 17,500,000 puds—out of which were manufactured 7,000,000 puds of wrought iron, 5,500,000 puds of puddled iron, and 97,000 puds of steel. Upwards of 30,000,000 puds of salt, extracted chiefly from salt lakes in Bessarabia and the Crimea, from Lake Elton in Astrakhan, and from the inexhaustible layers of rock-salt near Iletzk (q. v.). Excellent china-clay or kaolin is found near Gluchov in the government of Tchernigov.

Agriculture and Products.—R. is an eminently agricultural country, although only a comparatively small portion (271,000,000 acres) is under cultivation. In the *central zone* (see above, under *Surface*), the soil is almost entirely black mould, extremely fertile, and hardly ever requiring manure. The system of husbandry most extensively practised is what is called the 'three-field system,' in the working of which, one-third of the land is always in fallow. In the south and south-east, a system of agriculture peculiar to R. is in operation: it is called the 'fallow system,' and consists in raising three or four consecutive crops from the same land, and afterwards allowing it to lie fallow for five or six years, after which time it begins to grow feather-grass (*Stipa pennata*), which is considered a token of returning fertility. Husbandry, in general, has undergone great changes since the emancipation of the serfs, to whom a considerable portion of the land has been transferred in freehold. The landowners, deprived of their former right to the labour of their serfs, now find it more profitable to reduce the amount of their land in cultivation, or grant portions of it in lease to the peasants, often in return for the half of the produce of the crop. A great drawback to the development of agriculture is the want of proper means of communication, and consequently the low price of corn in the locality in which it is grown. Fodder-grass is rarely cultivated, as a sufficient supply of fodder is afforded by the extensive natural meadows. The chief cereals are wheat, which is grown as far north as lat. 62°; rye, barley, and oats. Buckwheat and millet are grown in the south, and from these, but specially from rye, the staple food of the inhabitants is made. Hemp and flax are extensively cultivated; and the oil extracted from the seeds of the former is an indispensable article of the peasant's household, as it is used for food during the fasts, which, taken together, extend over about half the year. Of flax, 12,000,000 puds are annually produced; of hemp, 7,000,000 puds, and 3,000,000 puds of oil-seeds. After the famine of 1839, government introduced, and afterwards did much to promote the cultivation of potatoes. The yearly produce of this crop amounts to 35,000,000 *tchetverts* (1 tchetvert = 5·77 imp. bushels). Tobacco crops cover 16,000 acres, and the amount produced is 2,500,000 puds. Beet-root and maize are also cultivated; and there are numerous vineyards in the Crimea, in Bessarabia, and along the Don. Gardening is an important branch of industry, the products being cucumbers, onions, cabbages, and other vegetables and fruits. An area of 486,000,000 acres is covered with woods, but the quantity of timber, from which material the peasant supplies almost all his wants, is at present suffering diminution. The Russian builds his cottage with timber, heats his room with it, lights his house with firewood, makes his household utensils from the same material, as well as his cart, &c.; he also wears shoes, and uses mats for coverings, which are made from the inner bark of the lime-tree. In the north, the forests occupy from 90 to 95 per cent. of the whole surface; in the south, they are 2 per cent. less than in England. Coniferous trees are the chief in the northern districts; but in the central tracts, oaks, limes, maples, and ashes are the chief. Timber is the chief article of internal commerce, and is floated down the rivers from the well-wooded districts to those which are destitute of wood.

Animals and Animal Products.—In the northern and central provinces, cattle are kept chiefly for the purpose of obtaining manure; but in other parts, cattle-breeding is an important branch of industry. On an average, there are 30,000,000 head of cattle in Russia. Of horses, the best, chiefly trotters, are reared in breeding-stables in the southern central governments; but the great bulk of the horses are obtained from the half-wild studs of the Cossacks, Kalmucks, and Kirghiz. The horses of Viatka, Kazan, and Finland are strong and hardy. The total number of the horses in R. is about 18,000,000. Sheep-breeding is carried on extensively on the southern steppes. The sheep number 10,000,000, of which upwards of 1,000,000 are of the fine merino breed. Besides these animals, there are camels in the south of R., reindeer in the north, and hogs and poultry in great abundance everywhere. A breed of the *Urus* (q. v.), a huge and rare animal, which does not occur in any other country, is preserved in a forest of the government of Grodno. Among the wild animals are (chiefly in the north), the bear, wolf, elk, fox, and marten; on the northern coasts, are found the seal and walrus, and the eider-duck and other wild-fowl. The more expensive kinds of furs are procured from Siberia, and from the Russian colonies in America, where the Russian-American Company has the exclusive privilege of the fur-trade. The most important Russian fisheries are those of the Caspian and Black Seas, and the Sea of Azof, and their tributaries. The Baltic Sea is not remarkably rich in fish; but the produce of the adjoining lakes is much more considerable. The herrings, cod-fish, and salmon, caught in abundance in the White Sea, constitute the chief resources of the inhabitants of the adjoining districts. The value of all the fisheries amounts to about £2,000,000. Bee-culture is very general in R., and of the wax obtained, 150,000 puds are used in making church candles. Silk-worms are reared chiefly in the Caucasus, where 30,000 puds of silk are produced annually.

History.—The population of the Russian empire is composed of various nationalities, but the predominant one is the Slavonic (q. v.). The Eastern Slavs, the ancestors of the Russians, were settled near the sources of the rivers Volkhof, Bug, Dniester, Dnieper, and Don, and consisted of several tribes whose chief towns were Novgorod and Kief. Being much harassed by their warlike neighbours, and distracted by intestine dissensions, the Slavs of Novgorod and the neighbouring Finnish tribes, in 862, sent ambassadors to 'the Variags (Varangians, Normans) beyond the sea,' inviting their chiefs to come and reign over them. Three brothers of the tribe, called by the old chroniclers *Rurik* (q. v.),

Sineous (Siudf), and Truvor, accepted the invitation, and at the head of a band of armed followers (*droujina*) took possession of the territory of Novgorod. Oleg (879—912), who exercised authority as regent to Igor, Rurik's son, took Kief, and made it the capital of the embryo empire, subduing the neighbouring tribes, and even successfully attacking the Byzantines. *Igor* (912—945) did nothing of note, but his widow and successor, *Olga* (945—957), was a wise and able ruler. She was baptised in 955 by the patriarch of Constantinople, and abdicated soon after in favour of her son *Sviatoslaf* (957—972), a warlike monarch and a pagan, who was treacherously murdered by a neighbouring tribe with whom he was at war. On his death, the principality was divided among his three sons, and the quarrels usual in such cases followed, and continued till *Vladimir* (980—1015), the youngest son, became sole ruler. The Normans now definitively became amalgamated with the Slavonic race. Vladimir's reign is the 'heroic' epoch of Russian history; and the glories of the court, and the valiant feats of the warriors of the 'sunny Prince Vladimir,' have been handed down through ages in legend and song. His successful wars extended the boundaries of R. to Lake Ilmen on the north, to the mouths of the Oka and of the Khoper (an affluent of the Don) on the east, to the falls of the Dnieper on the south, and to the sources of the Vistula on the west. He became a convert to the Greek faith, and in 988 was baptised with his followers; his example being shortly followed by the whole nation, for whose spiritual guidance and supervision a metropolitan was established at Kief. He followed the evil example of his father in dividing his dominions, and after his death a civil war broke out among his four sons, in which *Jaroslaf*, prince of Novgorod, was ultimately (1036) successful. This prince did much to civilise his subjects by building towns, founding schools, and especially by ordering the compilation of the first Russian code of laws (the 'Rousskaia Pravda'), the most prominent item of which was the limitation of the right of family feud, a limitation which was changed into total abolition after his death in 1054, by his sons, who shared the principality among them. Each of these petty princes in turn divided his portion of territory among his sons, till the once great and united realm became an agglomeration of petty states quarrelling with each other, undergoing absorption by a more powerful neighbour, or being redivided. This state of anarchy, confusion, and petty warfare dates from the death of Jaroslaf in 1054, and continued, more or less, till 1478. The principal among the subdivisions of R. during this period were, according to Russian authorities, *Sousdal*, which occupied the upper and central parts of the basin of the Volga, and from which, in the beginning of the 13th century, sprang the principalities of *Tver*, *Rostof*, and *Vladimir*; *Tchernigof* and *Seversk*, which occupied the drainage-area of the Dessna (an affluent of the Dnieper), stretching to near the sources of the Oka; *Riazan* and *Murom*, along the Oka basin and the sources of the Don; *Polotsk*, including the basins of the Western Dwina and Beresina; *Smolensk*, occupying the upper parts of the basins of the Western Dwina and Dnieper; *Volhynia* and *Galicia*, the first drained by the Pripet, the second lying on the north-east slope of the Carpathian Mountains, which were united in 1198; *Novgorod*, by far the largest of all, which occupied the immense tract bounded by the Gulf of Finland, the Lake Peipus, the upper parts of the Volga, the White Sea, and the Northern Dwina; and the grand-duchy of *Kief*, which, from its being formerly the seat of the central power, exercised a sort of supremacy over the others. Novgorod, however, from its size and remoteness, as well as from certain privileges which had been granted to it by Jaroslaf, was almost independent of the grand-duchy. The citizens of Novgorod chose their own dukes, archbishops, and in general all their dignitaries, and proved the superiority of their system of self-administration by increasing in power and wealth year by year. One of the chief factories of the great Hanseatic League was established in Novgorod in the 13th century. In fact, so great was its fame throughout R., as to give rise to the proverb, 'Who can resist God and the mighty Novgorod.' The princes of these states had each his standing army, and were continually quarrelling; but the people were less oppressed than would naturally be expected under such circumstances, on account of the establishment in each state of a 'common council' or *veche*, which exercised an important influence in state affairs, and without which the prince was almost powerless. This period was also marked by the gradual amalgamation of the different Slavic races into one, the present Russian race, a process doubtless aided by the universal dissemination of Christianity, which assimilated their various languages, manners, and customs. The chief of the grand dukes of Kief were *Vladimir*, surnamed 'Monomachus' (1113—1125), whom chroniclers are never tired of lauding as a model prince, and one whose authority was acknowledged almost as paternal by the princes of the other provinces. In 1163, the ruler of Vladimir took possession of Kief, and proclaimed himself grand duke. In 1222, the Mongol tide of invasion had swept westwards to the Polotzes, a nomadic tribe who ranged over the steppes between the Black Sea and the Don, and whose urgent prayers for aid were promptly complied with by the Russian princes; but in a great battle, fought (1223) on the banks of the Kalka (a tributary of the Sea of Azof), the Russians were totally routed. The Mongols, as usual, did not follow up their victory; but twelve years afterwards, Batû Khan, at the head of half a million of Kiptchak Mongols, conquered the east of Russia, destroying Riazan, Moscow, Vladimir, and other towns. The heroic resistance of Prince George of Vladimir cost the lives of himself and his whole army on the banks of the Siti. The Mongol conqueror's victorious career was, however, arrested by the impenetrable forests and treacherous marshes to the south of Novgorod, and he was forced to return to the Volga. In 1240, he ravaged the south-west, destroying Tchernigof, Galich, and Kief; ravaged Poland and Hungary, defeating the Poles at Wahlstatt, and the Hungarians at Saio; but being checked in Moravia, and receiving at the same time the news of the khagan's death, he retired to Saraï on the Akhtuba (a tributary of the Volga), which became the capital of the great khanate of Kiptchak. Thither the Russian princes repaired to swear allegiance to the khan, and take part in the humiliating ceremonies which the barbarous conqueror exacted from his tributaries. The taxes of R. were farmed out by the khan to contractors, who were generally oriental merchants, and they were collected by the aid, when necessary, of the khan's soldiers. But in later times (during the most of the 14th and 15th centuries), when the fiery energy of the Mongols was on the decline, the taxes were collected by the Russian princes and sent to Saraï. The Mongol invasion had an evil influence on the political, social, and moral life of R.; it totally destroyed the elements of self-government, which had already attained a considerable degree of development, arrested the progress of industry, literature, and the other elements of civilisation, and threw the country

more than 200 years behind the other states of Europe. The principalities of Kief and Tchernigof never recovered this crushing blow, and the seat of the metropolitan was removed to Vladimir. Their decline, however, made room for the rise of Galich to pre-eminence in Western R., and under the rule of a series of wise princes it preserved greater independence than any of the Russian principalities, till, in the latter half of the 13th c., it was taken possession of by Kasimir III. of Poland; and about the same time Volhynia was joined to the grand-duchy of Lithuania. The rise of this latter state was much favoured by the prostration to which the Russian princes were reduced by the Mongol invasion, and after a flourishing existence of several centuries, during which it extended in power, so as to include Livonia proper, and the Russian provinces of White R., Volhynia, Podolia, and the Ukraine, it was joined in 1569 to Poland. On the north of Lithuania arose in the beginning of the 13th c. another power, the Livonian Knights Sword-bearers, who took possession of Livonia, Courland, and Esthonia, as well as some portions of the territory of Novgorod and Pskov. The grand-ducal title passed after the Mongol invasion from Kief to Novgorod, and afterwards to Vladimir, where the celebrated Alexander Nevsky (q. v.) (1252 -1263) swayed the sceptre. In the beginning of the 14th c., Eastern R. consisted of the principalities of Sousdal, Nijni-Novgorod, Tver, Riazan, and Moscow, and long and bloody contests took place between the two most powerful of these, Tver and Moscow, for the supremacy. At last, under the guidance of *Ivan Kalita* (1328 - 1340), the founder of the system of administrative centralisation which prevailed down to the time of Peter the Great, Moscow became the chief grand-duchy. This result was due to various causes, of which the central position of Moscow, the prevalence there of the law of primogeniture, the favour of the Mongol khan, the sympathy of the church, whose head the metropolitan had removed thither from Vladimir in 1325, and the weakness of most of the other princes, were the chief. Ivan's son and successor, *Simeon the Proud* (1340 -1353), followed in his father's footsteps, as did also the regency which administered the government during the reign of the weak-minded *Ivan II.* (1353- 1359), and the minority of his son, *Dmitri* (1359 - 1389). Dmitri conquered Nijni-Novgorod, carried on war with success against Tver and Riazan, and profited by the weakness of the Mongol khanate, which was now divided into the four hordes of Nagaisk, Crimea, Kazan, and Astrakhan, to make the first attempt to shake off the shameful yoke under which the Russians had groaned so long. His brilliant victory over the Khan Mamai on the banks of the Don (1380), which conferred on him the epithet of Donskoi, was the first step to liberation; but the succeeding khan, in revenge, burned Moscow, exacted a heavy tribute from the people, and rivetted their bonds more firmly than ever. *Vassili I.* (1389 - 1425) obtained possession of the principality of Nijni-Novgorod with the full consent of the khan, and conquered Rostof and Murom. During his reign, R. was twice invaded by the Tartars, first under Timur, and again under Edijei, and was at the same time attacked by the Livonians. *Vassili II. the Blind* (1425—1462) reigned during a period marked with continual civil wars among the various princes for the grand-ducal throne; but from this period the division of power in Eastern R. rapidly disappeared, internal troubles ceased, and the re-united realm acquired from union the power of casting off the Tartar yoke. These results were achieved by *Ivan III.* (1462—1505), surnamed 'the Great,' who availed himself of every opportunity for abolishing the petty principalities which owed him allegiance as grand-duke, and manœuvred so skilfully, that some of the princes voluntarily surrendered their rights, others bequeathed their lands to him; while others, as the prince of Tver, were reduced by force of arms. The heaviest task of all, however, was the reduction of Novgorod, but so vigorously did Ivan carry out his schemes, that in 1478 this last of the great principalities was added to his empire. He then took advantage of the dissensions between Achmet, khan of the Golden Horde, and Mengli-Gherai, khan of the Crimean Horde, to deliver R. from its state of servitude by uniting with the latter; their combined arms destroying the power of the former in 1480; and the kingdom of Astrakhan, which rose on its ruins, was wholly unable to cope with the now powerful monarchy. He next turned his attention to the western provinces, which had formerly belonged to the descendants of St Vladimir, but were now in the hands of the Lithuanians, under whom the adherents of the Greek Church were bitterly oppressed by the Catholics, and accordingly hailed the advance of Ivan's army as a deliverance from persecution. The battle which followed was in favour of the Russians, but was productive of no results of any importance. Ivan married (1472) Sophia, a niece of Constantine Paleologus, the last Byzantine emperor, and introduced the arts of civilisation through the medium of architects, founders, coiners, miners, &c., whom he brought from Italy, and the result of whose labours is seen in the Kremlin and the Cathedral of the Assumption (Ouspenski Sobor). He also fortified many towns, introduced to his court the splendour of Byzantium, assumed the title of Czar of all the Russias, adopted the arms of the Greek empire, and united the existing edicts into a body of laws, the *Soudebnik*. *Vassili III.* (1505 -1533) followed closely his father's policy, made war upon the Lithuanians, from whom he took Smolensk, and incorporated with his dominions the remainder of the small tributary principalities. His son, *Ivan IV.* (1533—1584), known afterwards as 'The Terrible,' became monarch at the age of three years, and the country during his long minority was distracted by the contentions of factious bojars who strove for power. Fortunately, however, on his attaining his majority in 1547, he found two wise and prudent counsellors, Sylvestre and Adascheff, who, along with his queen, Anastasia Romanoff (see ROMANOFF), exercised over him a most beneficent influence. The interior administration was remodelled, the 'soudebnik' of his grandfather was reformed and amended, the *streltzi*, the first standing army in R., were established, and printing introduced. His arms were everywhere victorious; the strongly fortified city of Kazan was captured in 1552, and the kingdom of which it was the capital was annexed to his empire, and the kingdom of Astrakhan shared the same fate soon after. The marauding Tartars of the Crimea were held in check, and the Knights Sword bearers attacked and driven from Livonia and Esthonia. About this time a remarkable change came over Ivan's character, which seems to have been in some way connected with the death of his wife, Anastasia. He became suspicious of every one, believed himself surrounded with traitors, banished his two counsellors, Sylvestre and Adascheff, and persecuted the bojars, many of whom perished on the scaffold, while others fled to foreign countries. His insane rage fell upon whole towns; thousands of people were destroyed in Tver, Novgorod, and Moscow; and, finally, he murdered his eldest son. Stephen

Bathory, king of Poland, meantime wrested Livonia from him, and the Crim-Tartars made an irruption northwards, and burned Moscow. It was during the reign of this monarch that Western Siberia was conquered for R. by the Cossack Ermak. See SIBERIA. His son, *Feodor* (1584—1598), was a feeble prince, who intrusted his brother-in-law, Boris Godounof, with the management of affairs. Godounof was a man of rare ability and intellect, and proved himself an able administrator. The Russian dominion in Siberia was consolidated, numerous towns and fortresses were erected in the south as barriers against the Crim-Tartars, the Greek Church in R. was declared independent of the patriarch of Constantinople. Feodor was the last reigning monarch of the house of Rurik, for he died childless, and his only brother, Dmitri, was murdered in 1591 by order of Godounof, according to popular rumour. After the death of Feodor, representatives of all classes were convoked at Moscow to elect a new sovereign, and their choice fell on *Godounof* (1598-1601). The mysterious death of Prince Dmitri favoured the appearance of pretenders to his name and rank, the first of whom, a supposed monk of the name of Gregory Otrepieff (see DEMETRIUS), was defeated by Godounof, but on the sudden death of the latter he was crowned in 1605. A revolt, headed by Prince *Vassili Shouisky* (1606—1610) soon broke out, the czar was murdered, and Shouisky elevated to the vacant throne. But a second false Dmitri now appeared, and Sigismund of Poland, taking advantage of the confusion thus produced, invaded R., proclaimed his son Vladislaf czar, and took possession of Moscow (1610), carrying away the czar to die in a Polish prison. At the same time hordes of Tartars, predatory bands of Poles, and gangs of robbers devastated the provinces, and the wretched country was reduced almost to the verge of complete disorganisation. But the clergy nobly stood forth to save the state from ruin, and Minin, a common citizen of Nijni-Novgorod, so worked up the feelings of his fellow-citizens that they volunteered for military service, and chose as their leader the Prince Pojarsky, a man of distinguished valour. Pojarsky retook the capital, drove the Poles out of R., and convoked an assembly of representatives, who unanimously chose for their czar *Michael Feodorovitch Romanoff* (1613-1645). See ROMANOFF. The first care of the new monarch was to put an end to the revolt of the Don Cossacks, who had set up the son of the first false Dmitri as czar, and to the depredations of the robber-gangs in the south-west of Russia. In 1617, he concluded a treaty with Sweden, by virtue of which that power received the coasts of the Gulf of Finland and a considerable pecuniary indemnity, in consideration of Philip, the brother of the Swedish monarch, renouncing his claims to the Muscovite throne. In 1618 and 1634, he purchased peace from the Poles at the cost of Smolensk and a portion of Seversk. Having thus freed himself from all danger of foreign interference, he directed his attention to the internal administration, which, especially the courts of justice, was reduced to a deplorable condition, and to aid him in this necessary task, he summoned a general council of representatives at Moscow. *Alexei* (1645—1676), his son and successor, being a minor, the nobles seized the opportunity of increasing their power and exercising oppression and extortion over their inferiors, till rebellions broke out in various districts. Other causes of discontent were the heaviness of the taxes, the oppression of the serfs, the depreciation of the currency, which was changed from silver to copper, and the secession from the Russian Greek Church of those who disapproved of the changes and corrections in the books and liturgy of the church introduced by the patriarch Nikon. These malcontents were accordingly persecuted, and fled, some to the north of R., and others to the Ukraine, where they founded many colonies, and still exist apart under the name of 'Old Ritualists' (*Staro-obriadzy*). A general council, which was now convoked to deliberate on the best means of restoring peace to the country, revised the existing laws, and composed (1649) a new code—the 'Sobornoe Ulajenie,' which granted to every subject the right of direct appeal to the czar. Tolls on the highways were abolished, the English and other foreign merchants were deprived of their privilege of free-trade with R., and the silver currency reintroduced. The chief events in foreign policy were the acquisition of Little Russia, by the voluntary submission of the Cossacks (see POLAND); a consequent war with Poland, in which R. acquired Smolensk and the greater part of White Russia; and a war with Turkey, which continued till after the accession of *Feodor* (1676-1682), when it was terminated (1681) by the treaty of Bakhtchisarai, by which Turkey gave up all claims to Little Russia. After Feodor's death, the general council of the land, in accordance with his last wishes and their own predilections, chose his half-brother Peter as czar, but his half-sister Sophia, an able and ambitious princess (see PETER THE GREAT) succeeded in obtaining the reins of power as princess-regent. She concluded peace with Poland in 1686, made two unsuccessful campaigns against the Tartars of the Crimea; and after an attempt to deprive Peter of his right to the throne, and failing this, to assassinate himself and his mother, she was forced to resign all power and retire to a convent. All her accomplices were executed; and PETER (1689—1725) ascended the throne as sole ruler, his half-brother Ivan being allowed to retain the title of czar conjointly, and to appear as such at public ceremonies, but without any real authority. In order more fully to discover the importance of the changes wrought by Peter in R., a brief retrospect of its social and political condition at the date of his accession is necessary. At the head of government stood the czar with absolute power in administrative, judicial, and military affairs. In the exercise of authority he was aided by his council, the 'Bojarskaia Douma,' and in cases of extreme need by a general council of representatives of the people, which latter, however, possessed only a right of deliberation. The criminal code was cruel in the extreme. Of the standing army the streltzi only deserved the name. The population were divided into two great classes, the *bojars* or nobles, who were bound to render service for their estates, and the *burghus* or industrial and trading classes, and *serfs*, who were bound to the soil. The clergy exercised great influence over all classes, possessed offices in the 'douma,' and exercised political functions. Agriculture was at a low ebb, and the few manufactories and industrial establishments were in the hands of foreigners. Civilisation and learning, which had been introduced during the confederative period, had never recovered the shock they had received from the Mongol invasion, but in later times they entered R. through the connection of Novgorod with the Hanse League, and from intercourse with Poland, though they never reached the rural population or the lower classes. The education even of the higher classes was limited to reading and writing, and the first school for classics and theology only made its appearance during Feodor's reign. Fine arts were limited to architecture and painting (of sacred subjects) after the Byzantine school. The first newspaper appeared (in Moscow), and the first theatre was established,

during the reign of Alexis. The degraded condition of civilisation and the Oriental influence of the Mongols left powerful traces on the domestic manners and habits of the Russians, among which was the despotic authority of the father over his household, and the low position of women in domestic life, those of the lower ranks being made mere slaves, while those of higher rank were completely excluded from social intercourse with the other sex, and were condemned to pass a dull and dreary existence in their 'terems.' Marriages were concluded by the parents without the consent of the bride and bridegroom.

The history of R. during Peter I.'s reign is merely a biography of that monarch, and under his name is given a brief sketch of the numerous and important improvements effected by him in the government and civilisation of his subjects. It must, however, be noted, that, in the carrying out of his well-meant schemes, he seldom consulted the national character of his people, or the natural conditions of the country; and consequently, when the irresistible pressure of his high intellect and indomitable will was withdrawn, it was found that, in great part, the civilisation which he had forced upon his subjects was but skin-deep. In accordance with the terms of his will, his second wife, *Catharine I.* (q. v.) (1725—1727), succeeded him, though the old or anti-improvement part of the nobility supported the claims of the only son of the unfortunate Alexis (q. v.), *Peter II.* (q. v.) (1727—1730), who soon after obtained the imperial throne. The reigns of both of these sovereigns were occupied with court quarrels and intrigues, Menchikow (q. v.) during the former, and Dolgorouki during the latter, being the real rulers. On the death of Peter II., the privy council, setting aside the other descendants of Peter I., conferred the crown on Anna (q. v.), Duchess of Courland, the daughter of Ivan. Her reign (1730—1740) was marked by the predominance of the German party at court, who, unchecked by the weak sovereign, treated R. as a great emporium of plunder, and the Russians as barbarians (see BIRON). Under their influence, R. restored to Persia (q. v.) her lost Caspian provinces, and was led into a war with Turkey, which was productive of nothing but an immense loss of men and money. Her successor was *Ivan* (1740—1741), the son of her niece, Antonia, the Princess of Brunswick; but he was speedily dethroned by *Elizabeth* (q. v.) (1741—1762), the daughter of Peter I., who deprived the German party of the influence it had so shamefully abused, restored the senate to the power with which it had been intrusted by Peter the Great, established a regular system of recruiting, abolished tolls, and increased the duties on imports. During her reign, French influence was paramount, and the language of that nation supplanted German at court. R. gained by the treaty of Abo (1743) a portion of Finland, and took part in the *Seven Years' War* (q. v.). Elizabeth's nephew and successor, *Peter III.* (q. v.) (1762—1762), put a stop to all interference with the quarrels of Western Europe, and introduced some commendable ameliorations of the oppressive enactments of his predecessors; but he was speedily dethroned by his able and unscrupulous consort, who, as *Catharine II.* (q. v.) (1762—1796), ascended the throne, and proved herself the greatest sovereign of R. after Peter I. Her successful wars with Turkey, Persia, Sweden, and Poland, largely extended the limits of the empire; and while by her foreign policy protecting her subjects from external invasion, she as little forgot the necessity for internal reforms. The laws and administrative arrangements were revised, and the empire was divided into governments (an arrangement which, with very slight modification, still subsists), each government being under a separate administration, both as to matters of polity and justice. Her son and successor, *Paul I.* (q. v.) (1796—1801), at first, through apprehension of the revolution in France, joined the Austrians and British against France, but soon after capriciously withdrew, and was about to commence war with Britain, when his assassination took place. He gave freedom of worship to the 'Old Ritualists,' which till this time had been withheld; but he also established a severe censorship of the press, prohibited the introduction of foreign publications, and organised a secret police. His eldest son, *Alexander I.* (q. v.) (1801—1825), was at the outset desirous of peace, but was soon drawn into the vortex of the great struggle with France, in which he played a prominent, although at one period an inconsistent, part, and raised R. to the first rank among European States. The character of his rule and the internal improvements he effected are sketched under his name; and an outline of the warlike operations is given in the article NAPOLEON. The Holy Alliance (q. v.) and the example of conservative policy set by Austria, exercised a pernicious influence on the latter part of his reign; and the higher classes, who had looked for the introduction of at least a portion of the liberal institutions they had seen and admired in Western Europe, became so dissatisfied, that when his youngest brother, *Nicholas I.* (q. v.) (1825—1855), from whom they had nothing to hope, succeeded, they broke out into open rebellion, which was speedily crushed. A full stop was now put to the rapid advance of R.'s prosperity; wars were declared with Persia and Turkey; and a long and deadly struggle commenced with the Caucasian mountaineers—all for the ill-concealed object of extending Russian domination; and the cession of Erivan and Nakhitchevan by Persia, of the plain of the Kuban, of the protectorate of the Danubian principalities, and of the free right of navigation of the Black Sea, the Dardanelles, and the Danube by Turkey, only whetted his appetite for more spoil. In 1830, he converted Poland (q. v.) into a Russian province; in 1849, he officiously aided Austria in quelling the insurrection of the Magyars; and in 1853, his almost irresistible craving for more territory led him (being, in all probability, under the impression that Turkey would stand alone, as she had always done hitherto) into the Crimean war, in which, though the allies, Britain, France, and Sardinia, did not obtain any decided success, R. suffered immense loss of military prestige on the Danube, at Silistria, the Alma, and before Sebastopol, and was almost drained of her vast resources of men and money. This severe lesson has prevented any further (1865) aggressions in Southern Europe; and the accession of Nicholas's son, *Alexander II.*, (1855), one of whose first acts was the conclusion of the peace of Paris (1856), by which R. lost the right of navigation on the Danube, a strip of territory to the north of that river, and the unrestricted navigation of the Black Sea, has been the signal for the revival of those schemes of reform which had been crushed so despotically by the late czar. Alexander's first great reform was the abolition of serfdom, which created 14 millions of new free citizens, the mainstay of Russian agriculture. Corporal punishment, and the farming-system of the indirect taxes, were also abolished, the judicial power separated from the administrative, and founded on trial by jury, the term of military service lessened, many restrictions on the press and on publication removed, and land-banks established. The insurrection in Poland (q. v.), in 1863—1864, which was suppressed with extreme severity, went nigh to destroy the

good opinion that had been formed of the czar by Western Europe, notwithstanding the strenuous endeavours of his apologists to exonerate him from all blame at the expense of his agents; but, however this may be, it is to be hoped that a more liberal and conciliatory policy towards Poland will in some measure reconcile the Poles to the loss of their independence, and exhibit Alexander himself in a more favourable light. His foreign policy has been aggressive only in Asia, and has been attended with success, the complete submission of the Caucasus (1859), and the annexation of the valley of the Amur (1860), and of the north-east portion of Turkestan, with Tashkent (1865), being its fruits.

RUSSIAN CHURCH, the community of Christians subject to the emperor of Russia, using the Slavonic liturgy, and following the Russian rite. The early history of the R. C., as a distinct national community, is involved in much obscurity. That Christianity had been introduced into Russia before the middle of the 9th c., must be inferred from one of the letters of Photius, written in 866; but its diffusion was very limited. Even the prospect which, in the middle of the 10th c., was opened by the conversion and baptism of the Princess Olga (q. v.), was but slowly realised. Her son, Swatoslav, sturdily resisted the representations of his Christian mother and the missionaries; nor was it till the alliance of Wladimir with the court of Byzantium, by his marriage with Anne, sister of the Emperor Basil II., and his baptism in 988, that the foundation of Christianity can be said to have been regularly laid in Russia. Nicholas Chrysobergos, patriarch of Constantinople, taking advantage of the occasion, sent a bishop and a number of priests, by whom a number of the people were baptised in an incredibly short space of time, 20,000, it is said, having received baptism in a single day. At this time, Constantinople being in communion with Rome, the R. C. was also subject to the same jurisdiction; and although, in the schism under Michael Cerularius, the R. C. naturally followed silently in the train of Constantinople, yet, it would appear that at the time of the Council of Florence (1439), the adherents of the Roman Church throughout Russia were as numerous as those of the Greek party. The complete separation of the R. C. from Rome was effected by an archbishop of Kiew, named Photius, in the latter part of the same century.

For more than a century from this date, the R. C. continued directly subject to the patriarch of Constantinople; but in the year 1588, the patriarch Jeremias being in Russia, held a synod of the Russian bishops, and erected the see of Moscow into a patriarchate, with jurisdiction over the entire territory; this decree being afterwards confirmed by a synod held at Constantinople. This dignity, however, was subordinate to the patriarch of Constantinople, and the subordination was acquiesced in down to the reign of Alexis Michaelowitz, father of Peter the Great, when the patriarch of Moscow, Nikon, refused to acknowledge it further. The pretensions of this prelate, and of his successors, however, gave offence to the czar, and one of the first among the great schemes for the reorganisation of his empire, conceived by Peter the Great, was the suppression of the patriarchate, and the direct subordination of the church to the headship of the emperor. He took his measures, nevertheless, with great deliberation, and on the death of the patriarch Adrian, in 1700, he contented himself with not filling up the vacant dignity, appointing in the meantime as acting director of ecclesiastical affairs, a bishop, with the title of Exarch, by whom all matters of importance were to be referred, either directly to the czar, or to a council of bishops, who held their sittings at Moscow. After an interval of 20 years, the public mind having been taught to forget the patriarchate, that office was formally abolished in 1721; and the permanent administration of church affairs was placed under the direction of a council, called the 'Holy Synod,' or 'Permanent Synod,' consisting of archbishop, bishops, and archimandrites, all named by the emperor. Under the direction of this council, a series of official acts and formularies, and catechetical, doctrinal, and disciplinary treatises was drawn up, by which the whole scheme of the doctrine, discipline, and church government of the R. C. was settled in detail, and to which all members of the clergy, and all officials and dignitaries, are required to subscribe. The leading principle of the new constitution thus imposed in the R. C., is the absolute supremacy of the czar; and in order to mark still more signally the principle that the crown is the source of all church dignity and of all ecclesiastical jurisdiction, the arrangement of provinces, archbishoprics, and bishoprics underwent a complete revision; the old metropolitan sees, as they became vacant, were filled up with simple bishops, and not with archbishops as before; and a new arrangement of archbishoprics was established, partly by the act of the czar himself, partly by the interposition of the permanent synod.

The constitution of the R. C. established by Peter, has been maintained in substance to the present time. The Holy Synod is regarded as one of the great departments of the government, the Minister of Public Worship being *ex officio* a member. One of the most cherished objects of the traditional imperial policy of Russia, has been to effect a uniformity of religious profession throughout the empire. Dissent, in all its forms, has not only been discouraged, but in many cases rigorously and even cruelly repressed; and as the Roman Catholic dissentients from the R. C. form the most numerous, and the most formidable class, they have generally, but more particularly under the late Czar Nicholas, been the object of especial severity.

As regards doctrine, the R. C. may be regarded as identical with the common body of the GREEK CHURCH (q. v.). With that church the R. C. rejects the supremacy of the pope, and the double procession of the Holy Ghost. All the great leading characteristics of its discipline, too, are the same; the differences of ceremonial which exist being, although in many cases considered by the Russians themselves of vital importance, too minute to permit our entering into the detail. There is one point on which some explanation may be required. The liturgy of the R. C. is the same as that of the church of Constantinople; but it is celebrated not in the Greek, but in the Slavonic language. The service books, however, are not in the modern Russian, but in the ancient language, such as when they were originally translated, with the exception of the modification which they underwent at the time of the patriarch Nikon (see RASKOLNIK, PHILIPPINES), and the further revision under Czar Peter. The discipline, as to the marriage of the clergy, is the same as that described for the Greek Church; and in carrying out the law which enforces celibacy upon bishops, the Russians adopt the same expedient with the Greeks, viz., of selecting the bishops from among the monks, who are celibates in virtue of their vow.

Besides the established R. C., there exists also in Russia a not inconsiderable body of dissenters of various kinds. One class of these has been already described under the head Raskolniks. But by far the most numerous dissenters are the Roman Catholics, who are found chiefly in Poland and White Russia. At the partition of Poland, a special provision was made

for the Roman Catholic people of Poland, under the new government, by the erection of an archbishopric in communion with Rome, at Mohilew, in 1783; and the organisation was still more formally completed by the czar, Paul, who established, in 1798, five bishoprics under that metropolitan see, and the arrangements of the Congress of Vienna having somewhat deranged these ecclesiastical dispositions, a new arrangement was entered into by Pius VII. in 1818. But it cannot be doubted that the whole policy of the Russian government, in reference to the church, makes it almost impossible that they should permit free exercise of worship and of thought to the Catholics in communion with Rome. The direct legislation, and still more the practical administration of Russia in Poland, in reference to marriage, to church property, to conventual establishments, and to ecclesiastical regulations generally, has been a policy of repression and of compulsory proselytism. What has been the extent of the success attending this course of policy, it is difficult to ascertain.

The statistics of the R. C., as supplied in Wetser's *Kirchen-Lexicon*, give the numbers, exclusive of Raskolniks, at 44,000,000. The bishops number 73, of whom 7 are metropolitans, and 28 archbishops.

The United Russians, according to the same authority, are about 6,000,000, of whom 4,000,000 are Poles and 2,000,000 resident in White Russia. They are subject to two archbishops, of Mohilew and of Warsaw, and 13 bishops. See Wetser's *Kirchen-Lexicon*, vol. ix., art. 'Russen.'

RUSSIAN LANGUAGE AND LITERATURE. Russian, a principal member of the Slavic family of languages, first became a written language in the time of Peter the Great, till which period the Old Slavic—the language of the Church—had been the only medium of literary expression, and had, in consequence, exercised an important influence on the Russian popular speech, as on that of other Slavic dialects. The Mongol conquest, and the preponderance of Polish elements in the western parts of the empire, have also introduced into the Russian language a great number of Mongolian and Polish expressions; in addition to which, the efforts of Peter the Great to give his subjects the benefits of western culture, have enlarged the Russian vocabulary, especially in arts and industry, with numerous German, French, and Dutch words. The chief characteristics of Russian, as a language, are simplicity and naturalness. The grammatical connection of sentences is slight, and the number of conjunctions scanty. Perspicuity and expressiveness are obtained by the freedom allowed in the placing of words. Auxiliary verbs and articles there are none; while personal pronouns may or may not be used along with verbs. The vocabulary of Russian is very rich—foreign words being, so to speak, Russianised. The capability of the language for forming compounds and derivatives is so great, that from a single root not less than 2000 words are sometimes derived. The purest and most grammatical Russian is spoken in the centre, about Moscow. The oldest Russian Grammar is that of Ludolf (Oxf. 1696); others are the Grammars of the St Petersburg Academy (1802), of Gretsch (Petersb. 1823; new ed. 1834), and of Vostokov (7th ed. Petersb. 1848). A *Russian Grammar for Englishmen* was published at St Petersburg in 1822, and another (by Heard) in 1827. The best Dictionaries are those of the Russian Academy (4 vols. Petersb. 1847), of Heynn (3d ed. Leips. 1803—1805), of Schmidt (Lps. 1815), Oldekop (4 vols. Petersb. 1825), and Sokolov (Petersb. 1834). There is an English-Russian grammar and dictionary by Constantinoff (3 vols. London).

The beginnings of Russian literature are contemporaneous with the introduction of Christianity by the missionaries Cyril (q. v.) and Method, who employed the Old Slavic church-tongue for literary purposes. To this earliest period belongs—besides the *Prawda Ruskaja*, a book on law—the noted history or chronicle of Nestorius. After the subjugation of Russia by the Tartars, knowledge withdrew into the shelter of the monasteries, whence proceeded several important historical works. During this period of foreign domination, the Russian people seem to have sought consolation and hope in writing patriotic ballads and songs about their great hero-king, Vladimir (q. v.)—the Russian Charlemagne—the most celebrated of which is *Igor's Expedition against the Polovzi* (Berl. 1855). When at length the country was freed from the oppression of the Mongols by Ivan I., in 1478, Russian literature received a fresh impulse, but so tardy, nevertheless, were its motions, so circumscribed its achievements, that, up to the commencement of the 18th c., the only notable names that can be mentioned are the metropolitan Makarius (died 1564), who wrote *Lives of the Saints*, &c.; Zizania, the author of a Slavic Grammar (Wilna, 1596); and Matviejev (17th c.), who composed several historical and heraldic works. The czar, Alexei Michailovitch (whose prime-minister Matviejev was), caused a valuable collection of Russian laws to be printed in 1644, and shortly after founded an academy at Moscow, in which grammar, rhetoric, poetry, dialectics, philosophy, and theology were taught. But from political causes, the Polish element now began to predominate in Russian literature, and continued to do so, more or less, until the time of Peter the Great, who made his native language the universal vehicle of communication in business and writing. He established schools and founded the famous St Petersburg Academy. During his reign, the metropolitans Demetrius (b. 1651—d. 1709) and Javorskij (b. 1658—d. 1722); the archbishop Prokopovitch (1681—1736); Sellij (d. 1746); the national historian Tatishshev (1686—1750); the poets Kantemir; and the Cossacks, Klimovskij and Danilov; were the most distinguished supports of literature. The first to place on a firm basis the Russian metrical system, was Trediakovskij (1703—1769). In the period that followed the death of Peter, the writer that exercised the strongest influence on Russian literature was Lomonossov, who first drew the lines of distinction sharply between old Slavic and Russian, and established the literary supremacy of the dialect of Great Russia. Among his successors, the poet Sumarokov (1718—1777) did great service in the development of the Russian drama; so did Kniashnin (1742—1791), whose pieces still keep their place on the Russian stage; while Wizin (1745—1792) ranks as one of the first prose writers of his age.—Some of his prose comedies are full of the most genuine humour. Other notable names in poetry, belonging in whole or part to this period, are Cheraskov, Oserov, Prince Michailovitch, Dolgoruki, Chvostov, Petrov, Bogdanovicz, and Derzavin (q. v.), the first universally popular Russian poet. Prose literature, however, developed itself more slowly. Lomonossov was for a long time the model that was followed. Among the first to make a fresh reputation, were Platon, the metropolitan of Moscow, and Lewanda (1736—1814), archpriest of Kiev; who distinguished themselves from the mass of their bombastic brethren by the strength and vigour of their thinking; the historians Schtsherbatov (1733—1790), Boltin (1735—1792), and Muraviev (1757—1807). Still more important, in the same department, were the labours of the German, Gerh. Friedr. Müller, a native of Westphalia, who, in 1755, established at St

Petersburg the first literary journal. Novikov (1744—1818) gave a powerful stimulus to the book-trade and to literary productivity, partly by his professional zeal, and partly by the publication of a satirical journal, entitled *The Painter*, which was widely read.

A new epoch in Russian literature commenced with Alexander I., who was enthusiastic in the cause of education and progress. The number of universities was raised to seven; learned societies were also increased. The great ornament of literature at this period was Karamsin (q. v.), who freed it from the trammels of the pseudo classicism, within which it had been confined by Lomonossov. His labours were continued by Dmitriev and Batjushkov, while Shishkov combated with success the tendency to deprive the language of its Slavic character; and in the poetry of Shakovski, the national elements again re-asserted themselves. Along with these may be mentioned the historian Bolchovitinov (1767—1837) and the theologian Drosdov, archbishop of Moscow; the poet Koslov, Prince Alexander, Shachovski (d. 1846), one of the best comic authors of Russia, and possessed of amazing fertility; Gribojedov, Glinka, Prince Vjasemski (b. 1792), a celebrated song-writer, elegist, and critic; Davidov, and Gniedtsh. Merslјakov, who died a professor in Moscow, was a very able critic; while Chemnicer (1744—1784) and Krylov (1768—1844) rank first among the original fabulists of Russia. Bulgarin and Gretsh belong rather to the most recent period of Russian literature—a period characterised by the predominance of Russian influences, and the complete absorption into the one national spirit of all minor and foreign elements. The late Czar Nicholas laboured with his wonted passionate energy in this direction. Among the poets of this thoroughly Russian period, the most conspicuous and brilliant is Pushkin (q. v.), whose verses are a mirror of Russian life, in which we see shadowed forth the joys and griefs, the humour and the patriotism of the true Russian peasant. The most remarkable of Pushkin's contemporaries and successors are the poets Baratynski (d. 1844), Baron Delvig, Benediktov, Podolinski, and Lermontov, the dramatists Nikolaus Polevoi and Nestor Kukolnik, who drew the matter of their dramas from the national history; and Gogol (q. v.), one of the most illustrious names in Russian literature. Russian novels exhibit a condition of society in which barbarism struggles for supremacy with a superficial civilisation. The best writers in this department are Bestushev, Bulgarin, Sagoskin, whose most popular work, *Jury Miloslavski, or the Russians in 1612*, is modelled after the historical manner of Sir Walter Scott; Vasili Ushakov, author of *Kirgis-Kaisak*, &c.; Count Solohub, whose novels give a graphic picture of St Petersburg society; Prince Odojevski, Baron Theodor Korff, Konst. Masalski, and Senkovski, reckoned one of the first journalists in Russia; nor must the name of Alexander Herzen (q. v.), the 'liberal Russian' exile, be omitted. The delineations of Cossack life are too numerous for special notice, but they constitute quite a distinct section of the literature of Russian fiction, and are composed for the most part in the dialect of Little Russia. Great attention has also been paid in Russia, as in all Slavic countries, to popular songs and proverbs. The principal collections of these are by Novikov, Kaшin, Maximovitch, Makarov, and Sacharov. The latest developments of Russian literature have been chiefly in the department of history, and among the most distinguished names are those of Professor Ustrialov of St Petersburg, Professor Pogodin of Moscow, Polevoi, Vasili Berg (d. 1834), Lieutenant-general Michailovski Danilevski, Professor Snjegirev, Sreznevski, Slovzov, Samailov, Solovjev, Strovjev, Neverov, and Arszenjev. Such philosophy as exists in Russia is mainly an echo of the modern German schools, and therefore possesses no particular originality. Advances in theology are hardly to be looked for as yet from a church so deeply sunk in ignorance and intellectual stupor as the Russian, yet nowhere is reform more urgently required. Nevolin and Moroshkin have acquired a reputation as writers on jurisprudence; so has Nikita Krylov, professor at Moscow. The ablest physicists are Pavlov Maximovitch and Spaski; Perevoshtchikov is an eminent mathematician; and Vostokov is celebrated as a Slavic linguist. See Borg, *Poetic Works of the Russians* (Ger., 2 vols.; Riga, 1823); Gretsch, *Extracts from the Poets and Prose-writers of Russia* (St Petersb. 1821); Gretsch's *History of Russian Literature* (Petersb. 1822); Jevgenij, *History of Russian Literature* (Petersb. 1818-1827—1838); Köning, *Literary Pictures from Russia* (Stuttg. 1837); Otto, *Text-book of Russian Literature* (Lps. 1837; translated into English by Cox, Oxford 1839); Jordan, *History of Russian Literature* (Lps. 1846); and Talvi (Mrs Robinson), *Historical View of the Languages and Literature of the Slavic Nations* (New York, 1850).

RUSSNIAKS, also RUSSINE and RUTHENI, the name of a variety of peoples who form a branch of the great Slavic race, and are sharply distinguished from the Muscovites, or Russians proper, by their language and the entire character of their life. They are divided into the R. of Galicia, North Hungary, Podolia, Volhynia, and Lithuania, and are estimated by Schafarik at 13,000,000. They are almost all agriculturists, and, on the whole, rather uncultivated. Before the 17th c., they were a free race, but were then subjugated, partly by the Lithuanians, partly by the Poles, and for a long time belonged to the Polish kingdom. Their language has consequently become closely assimilated to the Polish. In earlier times it was a written speech, with quite distinctive characteristics, as may be seen from the translation of the Bible, published at Ostrog, in 1581, and from various statutes and other literary monuments still extant. Recently, printing in the Russniak tongue has been recommenced. The R. belong, for the most part, to the United Greek Church, but in part also to the Non-united. They preserve many old customs peculiar to themselves, and much folk-lore, prose and poetic, very like that current in Poland and Servia. This has been collected by Vaclav in his *Piesni Polskie i Ruskie* (Lemberg, 1833). Levicki has published a *Grammatik der Russinischen Sprache für Deutsche* (Przemysl, 1833).

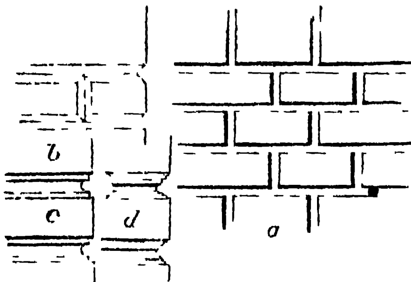
RUSSO-GERMAN WAR, the name given by German historians to the last stage of the great European war against Napoleon, beginning with the Russian campaign of 1812 and terminating on the field of Waterloo. See NAPOLEON.

RUST, the name given to a disease of plants, which shews itself on the stems and leaves of many plants, and on the ears of grasses, both of the cereal grasses, and of many pasture or forage grasses; in brown, yellow, or orange-coloured spots; and after destroying the epidermis of the plant, assumes the form of a powder, which soils the fingers when touched. R. seems to consist at first of small fungi of one cell, sometimes divided by a transverse wall, belonging to the genera *Uredo* and *Puccinia*; which, finally, breaking through the diseased epidermis, form a coloured dust consisting of mere spores. The name R. is sometimes restricted to

the *Uredo rubigo vera*, but it is doubted by some if this is not really a young state of a *Puccinia*. Not a few authors regard R. as an eruptive disease (*exanthema*), which makes its appearance chiefly in damp weather, and sometimes extends so far as seriously to injure the plants affected by it, the mycelium and spores which appear in it being regarded as present accidentally, or in consequence of the disease. This, however, is the least probable opinion concerning it.—R. is sometimes very injurious to crops. No remedy is known for it; but it is certain that rank manures tend to produce or aggravate it. See UREDO.

RUSTCHUK, a town of European Turkey in Bulgaria, eyalet of Silistria, and 70 miles west-south-west of the town of that name, on the south bank of the Danube, opposite Giurgevo. Its position on a range of hills, with its white chimneys, its mosques and minarets rising from amid forests of fruit-trees, give it a striking and picturesque appearance. It is surrounded by an extended line of fortifications, contains nine mosques, several Greek and Armenian churches, synagogues, and baths. The Danube is here about two miles wide, but its banks are low, and its channel is marked with islets and shallows. It is the most important manufacturing Turkish town on the Danube. The principal articles of manufacture are cloth, linen, leather, muslin, silk and tobacco. Pop. 30,000.

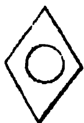
RU'STIC OR RU'STICATED WORK and **RUSTICA'TION**. The name of that kind of masonry in which the various stones or courses are marked at the joints by splays or recesses. The surface of the stone is sometimes left rough, and sometimes polished or otherwise dressed. Rustication is chiefly used in classical or Italian architecture, although Rustic Quoins (q.v.) are often used in rough Gothic work. In the figure, *a* and *b* shew



Rustication.

forms of rustication usually applied to surfaces; *c* and *d* shew rustic quoins with mouldings on the angles.

RUSTRE, in Heraldry, one of the subordinaries, consisting of a Lozenge (q.v.) with a circular opening pierced in its centre. Ancient armour was sometimes composed of rustres sewed on cloth.



Rustre.

RUTA BAGA. See TURNIP.

RUTA'CEÆ, a natural order of exogenous plants, consisting mostly of trees and shrubs, but containing a few herbaceous plants. The leaves have no stipules, are simple and entire, lobed, pinnate, or decompound, and are covered with pellucid resinous dots. The flowers are hermaphrodite, sometimes irregular. The calyx has four or five segments; the petals are equal in number to its segments, or wanting, or are united into a monopetalous corolla; the stamens are equal in number to them, or fewer by abortion, or twice or thrice as many. There is a cup-shaped disk. The ovary is sometimes stalked; it has as many carpels as there are petals, or fewer; there are generally two ovules in each carpel. The fruit consists of several capsules, cohering firmly or imperfectly.—There are about 400 known species, natives of the warmer temperate and of tropical regions. The *Diosmaceæ* are sometimes separated as a distinct order. A bitter taste and powerful odour are general characteristics. Rue, Bucku, and Dittany are examples of the order. See also ANGOSTURA BARK and BRUCEA. The barks of a number of tropical species, of different genera, possess febrifugal properties.

RUTH, BOOK OF, one of the Hagiographa, placed in the Authorised Version, as in the LXX., between Judges and Samuel; and in the Jewish canon, as the second of the five Megilloth, coming after the Song of Songs. It consists of four chapters, and describes how Ruth, the Moabite widow of a Hebrew, Machlon by name, in the time of the Judges, became—by faithful, loving adherence to her mother-in-law, Naomi, for whose sake she had left her home and kindred—the wife of Boaz, and through him the ancestress of David himself. A fragmentary genealogy of David's house—of which the principal links only are given—forms the conclusion of the book, which is characterised throughout by the most naive simplicity, and minute truthfulness of detail. If there be a tendency in the book—which is doubtful—it would naturally be to shew how utterly even that strictest of prejudices, in the mind of ancient peoples, especially the Hebrews, against intermarriage with the 'stranger,' is vanquished by genuine human love and piety; nay, that the heroine of the tale, even a Moabite, was deemed worthy for her virtue to become the foundress of the royal house of Israel. Considering that the Book of Kings contains no details about David's genealogy, this book, apart from its indescribable natural charm, becomes a most useful historical record, and further supplies many items on the forms and domestic customs of a time about which we have such very scant information elsewhere.

The time of the events related mounts back to about a century before David, yet both the contents and tendency of the book shew clearly enough that it was hardly written before the last years of David's reign, if it was at all written in his lifetime. For a change had already taken place in the interval in the manners and customs of the people (cf. the 'in former time,' iv. 7), and the genealogy carried down to David, shews the theocratic significance he had acquired by the time it was written down. Its canonicity has never been questioned in or out of the church.

RUTHE'NIUM (symb. Ru, equiv. 52, spec. grav. 11·3) is a metal which was discovered in 1843 by Claus in the ore of platinum. In most respects, excepting in its specific gravity, it closely resembles iridium, the coloured reaction of the salts being almost without exception the same in both. For details regarding this metal, which is of no practical importance, the reader may consult Deville and Debray's 'Memoir on Platinum and its Ores,' in the *Annale de Chimie et de Physique*, for 1859.

RU'THERGLEN, or, by popular abbreviation, **RUGLEN**, a royal, parliamentary, and municipal burgh, in Lanarkshire, on the Clyde, three miles south-east of Glasgow. It consists of one long wide street and of several narrow streets or lanes branching from it at right angles. In ancient times it was a place of considerable importance, carried on a large traffic on the river, and embraced

Glasgow within its municipal boundaries. Its trade is now mainly dependent upon that of Glasgow, and its inhabitants are employed in weaving muslins for Glasgow manufacturers, and in the mills, print, chemical, and dye-works, and collieries of the burgh and vicinity. Pop. (1861) 8062. In parliamentary representation, it is one of the Kilmarnock district of boroughs.

RU'THIN, a municipal and parliamentary borough of North Wales, in the county of Denbigh, eight miles south-east of the town of that name, stands on the summit and slope of a hill on the right bank of the Clwyd. The site of the ancient castle, said to have been built in the reign of Edward I., is occupied by a fine modern castellated edifice in Gothic. Pop. (1861) 3372.

RU'THVEN, RAID OF, a conspiracy of note in Scottish history, contrived and executed in 1582 by William, first Earl of Gowrie, father of the principal actor in the Gowrie Conspiracy (q. v.), in conjunction with Lord Lindsay of the Byres, the Earl of Mar, and the Master of Glammis. The object of the conspirators was to obtain the control of the state by seizing the person of James VI., then a boy of 16, and under the guardianship of the Duke of Lennox and Earl of Arran. The king being by invitation at Gowrie's seat of Ruthven Castle, the conspirators assembled 1000 of their vassals, surrounded the castle, and obtained complete possession of James. Arran was thrown into prison, and Lennox retired to France, where he died broken-hearted. The Presbyterian clergy warmly espoused the cause of the Ruthven lords, who received the thanks of the General Assembly, and full indemnity from a Convention of Estates. Nearly a year elapsed before the king regained his freedom. His feigned acquiescence in his position led the confederates so to relax their vigilance that he was enabled to throw himself into the castle of St Andrews, whose keeper was in his confidence, and thus to become his own master. Gowrie and the other lords made their submission, and were pardoned; but soon afterwards a royal proclamation characterised their enterprise as treason. Gowrie was commanded to leave Scotland; but while waiting for a vessel at Dundee, he was drawn into a conspiracy to surprise the castle of Stirling, for which he was tried and executed.

RU'TILE, a mineral, which is essentially *Oxide of Titanium* or *Titanic Acid*, although generally containing a little peroxide of iron. It is of a brown, red, or yellow colour; and is found massive, disseminated, in thin laminæ, and in four-sided or six-sided prisms, which are sometimes needle-like, and permeate rock-crystal. It is found also in granite, syenite, gneiss, mica-slate, limestone, chlorite-slate, &c., and its geographic distribution is very wide. It is used to give a yellow colour to porcelain.

RU'TLANDSHIRE, an inland county of England, much the smallest in England and Wales, is bounded on the N.E. by Lincoln, on the S.E. by Northampton, and on the W. by Leicester. Area, 95,805 acres; pop. (1861) 21,861. The river Wash, flowing east through the middle of the county, divides it into two portions, of which the northern is a somewhat elevated table-land, while the southern consists of a number of valleys running east and west, and separated by low hills. The principal streams are the Welland, forming the boundary on the south east, and its affluents the Wash and Chater. The climate is mild and healthy, the soil is loamy and rich, and there is hardly an acre of waste land in the whole county. R., however, is not a crop producing, but a grazing county. Oxen and sheep are reared in great numbers. R., which abounds in pleasing scenery, contains many stately mansions, as well as a number of ecclesiastical remains dating from the Norman period. The county returns two members to the House of Commons.

RU'VO IN APU'LIA, a city of Southern Italy, province of Bari, and 22 miles west of the city of that name. Pop. 15,133. It is built upon a rising ground, contains many churches, and two museums of Italo-Grecian vases, and is famous for its potteries. The staple produce is grain, pulse, and dried fruits. R. is the Rubi of Horace.

RUYS'DAEL, or **RUISDAEL**, JAKOB, was born at Haarlem. The date of his birth is uncertain; some make it 1625, others 1630 or 1635. It is said that there is a picture by him signed and dated 1645, which makes the last date improbable. He died in 1681. It has been stated, that for some years he directed his attention to the study and practice of surgery, but was advised by his friend Nicholas Berghem to devote his time to painting. In his pictures the trees are excellent in form, the foliage touched with sharpness and precision, and the skies are light and floating. His style of composition is entirely original, and characterised by a certain compactness in the arrangement; the Italian painters have generally groups of trees at the sides, and running out of the picture; in R.'s compositions, they are almost always massed within the picture. R. and Hobbima hold about an equal position—namely, that of the best landscape-painters of the Dutch school: but R. was also equally eminent for his sea-pieces. His etchings, seven in number, are much prized by collectors. Jan van Kessel and Jan Renier de Vries were imitators of Ruysdael. His elder brother, *Salomo* (born *circa* 1613, died 1670), was also a painter of some note.

RUY'TER, MICHAEL ADRIAANSZOON VAN, Dutch admiral, was born at Vlissingen in 1607, of poor parents, who sent him to sea as a cabin boy when only eleven years old. He became a warrant officer, and in 1635 rose to be a captain in the Dutch navy. After serving several years in the Indian seas, he was, in 1645, made rear admiral. He engaged and sunk a piratic Algerine squadron off Sallee in 1647. In 1652, when war broke out between the States and England, then under the Protectorate, he was placed in command of a squadron, and ordered to convoy a large number of merchant ships. He was met by the English fleet under Sir G. Ayscough off Plymouth, and an engagement took place. Neither of the fleets gained any decisive advantage; but R. succeeded in saving his convoy. In 1653, when a fight of three days took place between the English and Dutch fleets off Portland, R. commanded a division under Van Tromp. The English, under Blake, finally obtained a great victory, taking and destroying 11 Dutch men-of-war and 30 merchantmen. The states-general, in 1659, sent him to assist Denmark against Sweden. He defeated the Swedish fleet, and obtained a title of nobility and a pension from the king of Denmark. In 1664, he fell upon the English factories at Cape Verde, and attempted to seize the island of Barbadoes. As other depredations of the Dutch upon English merchants, as well in the East Indies as on the high seas, were complained of, war was declared against the Dutch. In June 1666, R. and Van Tromp, with 90 sail, engaged the English fleet under Prince Rupert and the Duke of Albemarle. Both sides fought with such obstinacy that the battle lasted four days, and ended without any decisive result. In July, the conflict was renewed, when the English gained a complete victory, destroying above 20 of R.'s

men-of-war. In 1667, he destroyed the shipping at Sheerness, sailed up the Medway as far as Chatham, burned several English men-of-war, and effected more towards the conclusion of peace at Breda (1667) than any diplomatist. In 1671, he commanded the Dutch fleet, and fought several battles with the combined English and French fleets, but without decisive results. In 1675, he was sent to the Mediterranean. He fought, off the coast of Sicily, a desperate battle with the French fleet, under the celebrated Admiral Duquesne. Victory declared itself on the side of the French; but R. made good his retreat into the harbour of Syracuse. He had his legs shattered in the engagement, and died of his wounds, April 1676. Europe did justice to his bravery; and Louis XIV. said he could not help regretting the loss of a great man, although an enemy. His death was deeply mourned by his countrymen, and a splendid monument was erected to his memory at Amsterdam.

RY'AN, LOCH. See WIGTONSHIRE.

RYBI'NSK, a district town of Great Russia, in the government of Jaroslav, stands on the right bank of the Volga, 418 miles east-south-east of St Petersburg. It is the great centre of the corn trade on the Volga, and, after Nijni Novgorod, is the chief commercial centre on that river. The trade of R. consists principally in transhipping and forwarding to the capital the goods brought hither by large vessels up the Volga. For this purpose, upwards of 6000 barges are built here every year. The landing-place extends along the river for several miles, and is divided into nine sections, each of which is appropriated to special varieties of goods. The chief articles of trade are corn, flour, tallow, spirits, metals, and timber, and these are forwarded to St Petersburg by three systems of communications, of which the Mariinsky Canal conveys goods to the value of £5,000,000; the Tichvin Canal, goods to the value of £4,000,000; and the Vyshnivolotsk Canal, goods to the value of £2,000,000. Pop. 8643.

RYDE, a flourishing and fashionable watering-place and market town, on the north coast of the Isle of Wight, Hampshire, occupies the east and north slopes of a hill, six miles south-south-west of Portsmouth, from which it is separated by the roadstead of Spit Head. It consists of Upper and Lower R.; the former anciently called *Rye*, or *La Riche*, and the latter of quite modern construction. The shores are wooded to the verge of the water, and the appearance of the town, with its streets and houses interspersed with trees, is pleasing and picturesque. The pier, nearly a mile in length, forms an excellent promenade. Yacht and boat-building are carried on to some extent. Steamers cross every hour to Portsmouth in summer, and several times a day in winter. R., the largest town in the island, had, in 1851, 7147, and in 1861, 9269 inhabitants.

RYE, a seaport, market-town, and parliamentary and municipal borough in the south-east of the county of Sussex, ten miles north-east of Hastings. It is charmingly situated on an eminence bounded east by the Rother, and south and west by the Tillingham, which streams unite here, and, entering the sea two miles below the town, form the old harbour. The appearance of the town is remarkably quaint and old-fashioned. Overlooking the junction of the streams is a small castle built by William de Ypres, in the reign of Stephen, and now used as a jail. The church is a beautiful and interesting structure—the central tower, transepts, a number of circular arches, &c., all being early Norman. In former times the sea flowed close up to R., washing the rock on which the Ypres tower stands, but it has retired to a distance of two miles. The harbour admits vessels of 200 tons, and has been recently improved. This ancient town receives historical mention as early as 893. It was walled on two sides by Edward III., and contributed nine ships to the fleet with which that monarch invaded France. Brewing, ship-building, and a growing trade in corn, coal, timber, hops, &c., are carried on. R. is one of the Cinque Ports, and sends a member to parliament. Pop. (1861) 8202.

RYE (*Secăle*), a genus of grasses allied to Wheat and Barley, and having spikes which generally consist of two-flowered, rarely of three-flowered, spikelets; the florets furnished with terminal awns, only the upper floret stalked. One species (*S. cereale*) is a well-known grain. It has, when in fruit, a roundish-quadrangular spike, with a tough rachis. Its native country, as in the case of the other most important cereals, is somewhat doubtful; but it is said to be found wild in the desert regions near the Caspian Sea, and on the highest mountains of the Crimea. It has long been cultivated as a cereal plant; although the supposed mention of it in Exodus ix. 32 is doubtful, spelt being perhaps intended. It is much cultivated in the north of Europe and in some parts of Asia. Its cultivation does not extend so far north as that of barley; but it grows in regions too cold for wheat, and on soils too poor and sandy for any other grain. Its ripening can also be more confidently reckoned upon in cold regions than that of any other grain. But R. succeeds best, and is most productive, in a climate where wheat still ripens. It delights in sandy soils. The varieties of R. are numerous, although much less so than those of other important cereals. Some are best fitted for sowing in autumn, others for sowing in spring. The former kinds (*Winter R.*) are most extensively cultivated, being generally the most productive. In some places on the continent of Europe, R. is sown at midsummer, mowed for green fodder in autumn, and left to shoot in spring, which it does at the same time with autumn-sown R., producing a good crop of small but very mealy grain. In Britain, R. is not a common grain crop, and is cultivated to a smaller extent than it formerly was; the sandy soils, to which it is best adapted, being improved and fitted for other kinds of corn. It is, however, sometimes sown to be used as a green crop, for feeding sheep and oxen in winter, and is found particularly good for milch cows. It is sometimes also mown for horses and other animals.—Bread made of R. is much used in the north of Europe. It is of a dark colour, more laxative than that made of wheat-flour, and, perhaps, rather less nutritious. R. is much used for fermentation and distillation, particularly for the making of *Hollands*. R. affected with Ergot (q. v.) is a very dangerous article of food. The straw of R. is tougher than that of any other corn-plant, and is much valued for straw-plait.—PERENNIAL R. (*S. perenne*) differs from Common R. in having a very hard, red-like culm; ears, 3—5 inches long, flatly compressed, with a brittle rachis, and 50 - 60 closely imbricated spikelets. It endures for many years, but is not much cultivated, as its grain is slender, and does not yield an easily separable flour.

RYE-GRASS (*Lolium*), a genus of grasses, having a two-rowed, flatly-compressed spike, the spikelets appressed edgewise to the rachis. COMMON R., or PERENNIAL R. (*L. perenne*), the *Ray-grass* of the older English authors, is frequent on waysides, and in meadows and pastures, in Britain and on the continent of Europe. The spikelets are much longer than their solitary external glume, 6—8-flowered;

the florets awnless or nearly so; the culm flattened, from one foot to three feet high; the root producing leafy barren shoots, which add much to the agricultural value of the grass. This grass is highly valued for forage and hay, and is more extensively sown for these uses than any other grass, not only in Britain, but on the continent of Europe and in North America. It grows well even on very poor soils. The *Common Perennial R.* is the kind most generally cultivated. A kind called *Annual R.*—not really an annual plant, although useful only for one year—is sometimes cultivated; but is, in almost every respect, inferior.—ITALIAN R. (*L. Italicum*, or *L. multiflorum*, or *L. Bouchianum*), a native of the



1, Common Rye-grass; 2, Italian Rye-grass.

south of Europe, is much esteemed as a forage and hay grass. In many soils and situations in Britain it succeeds extremely well, and is remarkable for its verdure and luxuriance in early spring. It is preferred by cattle to the Common Rye-grass. The young leaves are folded up, whilst those of the Common R. are rolled together.—There are many varieties of Rye-grass. It is nowhere so much valued or cultivated as in Britain. It was cultivated in England before the end of the 17th century. Italian R. was introduced into Britain in 1831 by Mr Thomson of Banchory and Messrs Lawson and Son of Edinburgh. R. is generally sown along with some kind of corn, and vegetating for the first year amongst the corn, appears in the second year as the proper crop of the field.

RYE'HOUSE PLOT. In 1683, at the same time that a scheme was formed in England among the leading Whigs to raise the nation in arms against Charles II., a subordinate scheme was planned by a few fiercer spirits of the party, including Colonel Rumsey and Lieutenant-colonel Walcot, two military adventurers; Goodenough, under-sheriff of London; Ferguson, an independent minister; and several attorneys, merchants, and tradesmen of London—the object of which was to waylay and assassinate the king on his return from Newmarket. The deed was to be perpetrated at a farm belonging to Rumboldt, one of the conspirators, called the Ryehouse Farm, whence the plot got its name. The R. P. is supposed to have been kept concealed from Monmouth, Russell, Shaftesbury, and the rest of those who took the lead in the greater conspiracy. It owed its defeat to the circumstance, that the house which the king occupied at Newmarket took fire accidentally, and Charles was thus obliged to leave that place eight days sooner than was expected. Both the greater and lesser conspiracy were discovered before long, and from the connection subsisting between the two, it was difficult altogether to dissever them. The indignation excited by the R. P. was extended to the whole Whig party; Lord Russell, Algernon Sidney, and Lieutenant-colonel Walcot were brought to the block for treason; John Hampden, grandson of his more noted namesake, was fined £40,000; and scarcely one escaped who had been concerned in either plot.

RY'OT (from the Arabic *raaya*, to pasture, to protect, to govern; hence, literally, the governed, a subject) is the vernacular term for a Hindu cultivator or peasant.

RYOTWAR (literally, according to or with ryots) is the term applied to the revenue settlement which is made by the government officers in India with each actual cultivator of the soil for a given term—usually a twelvemonth—at a stipulated money-rent, without the intervention of a third party. This mode of assessment prevails chiefly, though not exclusively, in the Madras presidency. See H. H. Wilson, *Glossary of Judicial and Revenue Terms* (Lond. 1855), under RÁIYATWÁR.

RYSBRACH, MICHAEL, a sculptor of considerable talent, born at Antwerp in 1693. He settled in London in 1720, and executed numerous works there, in particular the monuments to Sir Isaac Newton in Westminster Abbey, and to the Duke of Marlborough at Blenheim, a bronze equestrian statue of William III. for the city of Bristol, a colossal statue of George II. for the parade at Greenwich Hospital; a Hercules, and busts of many of the eminent poets, wits, and politicians of his time. Scheemakers, also a native of Antwerp, and Roubilliac, a Frenchman, were contemporaries and rivals of his, and shared with him most of the commissions for works of sculpture in England at the period. With Scheemakers was placed as a pupil Nollekens, who became so distinguished for his busts, and as one of the founders of the English school of sculpture. R. died 8th January 1770.

RYSWICK, PEACE OF, a treaty concluded in 1697 at Ryswick, a Dutch village between Delft and the Hague, which was signed by France, England, and Spain on September 20, and by Germany on October 30. It put an end to the sanguinary contest in which England had been engaged with France. It has been often said that the only equivalent then received by England for all the treasure she had transmitted to the continent, and all the blood which had been shed there, was an acknowledgment of William's title by the king of France; but it must not be forgot how much the allies were benefited by the check given to the gigantic power and overweening ambition of France.

S



S THE 19th letter in the English and other western alphabets (the 18th in the Latin), belongs to the dental series, and marks the fundamental sound of the hissing or sibilant group, *s*, *z*, *sh*, *zh*. The Sanscrit has characters for three hissing or *s*-sounds; the Semitic languages had four (see ALPHABET). The Hebrew or Phœnician character, from which the modern *s* is derived, was called *shin*—i. e., tooth, and in its original form probably represented two or three teeth. The same character, with the presence or absence of a diacritic point, marked either *s* or *sh*. In Eng., *s* is used both for the sharp and flat sounds, as *this*, *those* = *thoze*. The nearness of the *s*-sound to *th* is seen in the Eng. *loves* = *loveth*, and in the phenomenon of lisping *yeth* = *yes*. This seems to furnish the transition to the so frequent interchange of the High-Ger. *s* for the Low-Ger. *t*, as in Ger. *wasser* = *water*; Ger. *fuss* = *foot*. Comp. Gr. *thalassa* = *thalatta*. The substitution of *r* for *s* is noticed under R. In such cases as *melt*, compared with *smelt*; *pike*, with *spike*; *lick*, with *sleek*; Ger. *niesen*, with Eng. *sneeze*; Eng. *snow*, Goth. *snaivs*, with Lat. *nix* (gen. *nivis*); Gr. *mikros*, with *smikros*; *short*, A.-S. *sceort*, with *cut*—it is difficult to say whether the form with, or that without the *s* is the older. Grimm considers *s* as the remnant of an old prefixed particle (*as*, *is*, *us*), having, perhaps, the force of *ex* in Lat. *exopto*, I wish greatly; or *ur* in Ger. *urklein*, very small. An initial *s* before a vowel in Lat. corresponds to Gr. *h*; comp. Lat. *sub*, *sex*, *sal* (salt), with Gr. *hypo*, *hex*, *hals*. In Greek and Latin, *s* was pronounced feebly at the end of words, and still more so between two vowels. It thus frequently disappeared in these positions, and this was one of the chief sources of the irregularities in the declensions and conjugations, which had originally been formed on a uniform system (see INFLECTIONS). The dropping of *s* is one of the ways in which the forms of modern French words have become so degraded; compare Lat. *magister*, old Fr. *maistre*, modern Fr. *maître*; *presbyter*, *prestre*, *prêtre*. Even where still written, final *s* in French is mostly silent—e. g., *vos*, *les*.

SAAD-ED-DIN, a Turkish historian, was born in 1536, and died at Constantinople in 1599. His history, entitled the *Taj al-Tuarikh* (the Crown of Histories), a work held in high estimation by scholars, gives a general account of the Ottoman empire from its commencement in 1299 till 1520; it has never been printed, but MS. copies of it are found in most of the great libraries of Europe, and an inaccurate translation into Italian was published in 1646—1652. S. also wrote the *Selim-Nameh*, or History of Selim I., which is chiefly a collection of anecdotes regarding that prince.

SAALÉ, a river of Germany, distinguished from other and smaller rivers of the same name as the Saxon or Thuringian S., rises on the western slope of the Fichtelgebirge (Bavaria), and flowing northward through several minor states, and finally across the Prussian province of Saxony, falls into the Elbe, about 25 miles above Magdeburg, after a course of 200 miles. It is navigable only within the Prussian dominions.

SAA'RBRUCK, a town of Rhenish Prussia, on the Saar, 40 miles south-south-east of Treves. It is the seat of an active industry, of which coal-mining, spinning, and the manufacture of woollen and linen fabrics, and of pottery and tobacco, are among the principal branches. Pop. (1862) 11,288, exclusive of the suburb of St Johann, on the left bank of the river, which contains 3360 inhabitants.

SAA'RDAM. See ZAANDAM.

SAAZ, a town of Bohemia, on the Eger, 45 miles west-north west of Prague. Hops are largely cultivated in the vicinity, and important corn-markets are held. Pop. 5800.

SABADE'LL, a rising manufacturing town of Spain, in Catalonia, 14 miles by railway north-west of Barcelona. It has risen into importance only within recent years, and is now the Manchester of Catalonia. Woollen and cotton fabrics are the staple manufactures, and of the 100 factories in the town, by far the greater number are engaged in these manufactures. Pop. about 16,000.

SABADI'LLA, CEBADILLA, or CEVADILLA (*Asagræa officinalis*, formerly *Helonias officinalis*), a Mexican plant of the natural order *Melanthaceæ*, the seeds of which are employed in medicine, because of properties analogous to those of White Hellebore (*Veratrum album*). The plant has a bulbous root, and grows in tufts; the leaves are linear and grassy, about four feet long, and not above a quarter of an inch broad; among them rises a round *scape* (leafless flower-stem), about six feet high, bearing a very dense raceme, a foot and a half long, of small white flowers. The seed-vessels are papery *follicles*, three together; the seeds one, two, or three in each follicle, two or three lines long, winged, and wrinkled. The powdered seeds have been known in medicine since the end of the 16th century. On submitting them to chemical analysis, they are found to consist of fatty matter, two special organic acids, to which the names *Cevadic* and *Veratric* acids have been given; of varieties of resin, yellow colouring matter, gum, and a highly poisonous alkaloid named *Veratria* in combination with gallic acid; and to these constituents, a French chemist, Couerbe, has added a crystalline body named *Sabadilline*.

Notwithstanding its highly poisonous properties, S. is prescribed on many parts of the continent as a vermifuge in cases of tape-worm and ascarides, and it may be administered to an adult in 8 or 10 grain doses, mixed with a little sugar, and a few drops of oil of fennel. In the form of powder, it is sometimes applied to the head to destroy lice, but if the skin be broken, some other remedy should be selected, as absorption to a dangerous extent might

ensue. From its stimulating properties, it is usefully employed in the form of tincture (which, however, is not an official preparation) as an external application in chronic rheumatism and paralysis, and in cases of nervous palpitation.

The active principle of S., the *Veratria*, in doses of $\frac{1}{12}$th of a grain, gradually increased, and taken thrice a day, has been found very efficacious in acute rheumatism; and applied in the form of ointment, it has been highly recommended in scrofulous diseases of the joints. When prescribed internally, its use should be at once suspended if the patient complain of pain in the throat or stomach, vomiting or diarrhœa.—Similar qualities are said to exist in the seeds of *Veratrum Sabadilla*, a native of Mexico and the West Indies, and in some of the species of *Helonias*, natives of the southern parts of North America.

SABÆ'ANS, the supposed descendants of one, two, or three Shebas mentioned in the Bible. Historically, the S. appear chiefly as the inhabitants of Arabia Felix or Yemen (to the north of the present Yemen), the principal city of which was called Saba, and the queen of which is said to have visited Solomon, attracted by the fame of his wisdom. Josephus, however (*Ant.* viii. 6, 5), makes her the queen of Ethiopia (Meroe), and the modern Abyssinians claim her as their own. Her name, according to their tradition, was Makeda; and her visit to Jerusalem made her not only a proselyte to the religion of Solomon, but she became one of his wives, and had by him a son, Menilek, who afterwards ruled Ethiopia (q. v.). The Arabs, on the other hand, call her Balkis, the earliest name that occurs of a Himyaritic queen, but there is no more historical value to be attached to this tradition than to the innumerable legends that have clustered round her name in connection with the great king.

Numerous passages in Greek and Roman writers, as well as in the Bible, testify to the vast importance of these dwellers in Yemen as a wealthy, widely-extended, and enterprising people, of fine stature and noble bearing. Their chief greatness lay in their traffic, the principal articles of which consisted of gold and perfumes, spice, incense and precious stones, a very small portion of which, however, was of home production, Yemen being only productive in corn, wine, and the like matters of ordinary consumption. But the fact was, that the S. held the key to India, and were the intermediate factors between Egypt and Syria, which again spread the imported wares over Europe; and even when Ptolemy Philadelphus (274 B.C.) had established an Indian emporium in Egypt, the S. still remained the sole monopolists of the Indian trade, being the only navigators who braved the perilous voyage. As in many other respects, they also resembled the Phœnicians in this, that, instead of informing other people of their sources and the tracks of their ships, they told them the most preposterous tales about the countries they visited, and the fearful dangers they encountered; and in regard to most things, endeavoured to impress upon the minds of their customers that what they sold them was, if artificial, their own manufacture—if natural products, home growth. Being the principal merchants of those things which the over-refined luxury of late classical times considered as absolute necessities of life, they could not fail to gather enormous riches; e. g., in the 3d c. of the Roman empire, every pound of silk—a material enormous quantities of which were used—that came from Arabia was paid by a pound of silver, at times even of gold. As a natural consequence, the S. became luxurious, effeminate, and idle. The pictures of them drawn by the classic writers are doubtless exaggerated. The country itself, according to the reports of Greek writers, grew spice-wood to such an extent that its odour caused apoplexy among the inhabitants, and bad smells had to be used to counteract these over-potent influences. The meanest utensils in the houses of these merchant princes were—if we were to credit those writers—wrought in the most cunning fashion, and were of gold and silver; their vases were incrusted with gems, their firewood was cinnamon. Their colonies must, in the nature of things, have extended over immense tracts of Asia—the Ethiopian S. probably being one of the first foreign settlements; yet nothing beyond the vaguest conjectures can be given about them. Regarding their government, Dio Cassius informs us that they had a king, who never was allowed to leave his palace, and that the first child born, after the accession of a new king, into one of a certain number of noble families, was considered the heir-presumptive for the time being. Commerce had also done for them what it did for the Phœnicians—it civilised them, and caused them to carry civilisation further; and they stand out among the ancient semi-barbarous Arabs as a commonwealth of high culture. Respecting their religion, see ZABISM. Their language is supposed to have been a Semitic (Arabic) dialect, which, however, is almost entirely lost to us now. Some tablets with Himyaritic inscriptions have been found, but their readings are not quite satisfactorily fixed as yet. See SHEMITIC LANGUAGES, ARABIA.

SA'BBATH (Heb. *Shabbath, Sabbathon*, &c., from *shabath*, to rest; not from *shub*, to return, or *shebah*, seven) designates the seventh day of the week, set aside, in the Old Testament, as a period of cessation from work. Without entering into the question of its origin, i. e., whether it be an institution of pre-Mosaic times—either of 'paradise' or of 'heathenism'—or whether it be purely Mosaic, we shall merely state that, according to our only available source, the Pentateuch, the division of the Week (q.v.) into seven days appears at a very early period; but the celebration of the seventh day as a day consecrated to Jehovah, is first mentioned after the Exodus from Egypt, and seems to have preceded the Sinaitic legislation, which merely confirmed and invested it with the highest authority. On the occasion of the manna (Ex. xvi. 23), the S. and its solemnity seem presupposed, and the 'Remember the Sabbath-day' of the Decalogue, further seems to indicate its previous institution. There is no trace of its celebration in the patriarchal times, although the Semitic traditions of the creation, and of the divine completion of it on that day, had undoubtedly marked it early as a special day of sanctity among the Abrahamites. The significance that was superadded to it after the Exodus, i. e., that of being a remembrance of the freedom from bondage, makes it appear likely enough that its first legal promulgation dates, as a Talmudical tradition has it, from Marah, where Moses 'set them laws and rights' (Ex. xv. 25). While it thus on the one hand formed a sort of general human memento of the creation and the Creator of all things, as it is characterised in the first redaction of the commandments in Exodus, it became also, on the other hand, a national day of record of the bondage and the liberation from it, a notion prominently brought forward in the second recension of the Decalogue (q. v.) (Deut. v. 15), and the 'rest' that was inculcated for everybody—kindred, strangers, slaves, even animals—received a double meaning. It is in the latter sense also denominated a sign between Jehovah and the generations of Israel (Ex. xxxi. 13): a kind of badge of nationality, a token of the covenant between Jehovah and Israel for ever (Ex. xxxi. 16,

cf. Ezek. xx. 12, Neh. ix. 13, &c.). It is constantly mentioned together with institutions of the same peculiar nature; such as reverencing the sanctuary (Lev. xix. 30), celebrating the feasts of a national character (Hos. ii. 11), keeping the ordinances (Ezek. xlv. 17), &c. And in like manner it was made one of the first obligations for proselytes, as one by which they were 'taking hold of the covenant' (Is. lvi. 6). A few special cases only are furnished by the Pentateuch in explanation of the word 'work' used in the prohibition—lighting a fire, gathering sticks, going out of the camp for the purpose of gathering manna. The violation of this law of rest was, as a crime of high treason against Jehovah, punishable with death; yet cessation from labour was only the negative part of the celebration of the day, which is called, like the other festivals, a 'holy convocation.' It is difficult to decide now what precise meaning is to be attached to these words, as referring to the early periods of Israelitish history, particularly before the institution of the prophets or sacred orators had been fully developed. It may be conjectured that the convocation was a kind of general religious assembly, in which readings and some kind of exposition of the law formed the principal features; and there is indeed a tradition to that effect recorded in the Talmud. Some, however, suppose that it was a festive meeting in honour of Jehovah, and refer to Neh. viii. 9—18 for proof that such a celebration was consistent with Jewish notions of keeping days holy to the Lord. As a further celebration of the day, a special burnt-offering, consisting of two lambs of the first year, with the corresponding meat and drink-offering, besides the ordinary daily sacrifice, was instituted, and the shew-bread was renewed in the sanctuary.

Thus far the Pentateuch on the Sabbath. Turning to the later biblical books of the times before the Exile, we find casual references to it as a day of rest and joy, exalted over the other days of the week, and on which agricultural labours and all things connected with them, such as carrying loads, selling and buying, &c., ceased. No deeper signification seems to have been attached to it yet. Although both Jeremiah and Ezekiel, single it out especially, in common with monotheism and the laws of morality, yet they both rest satisfied with the inculcation of its outward observance, which seems occasionally to have fallen into entire disuse. With the return from the Exile, however, a new phase was inaugurated. It is well known how energetically Nehemiah carried out his reformation, or rather the restoration of the primitive laws, a in other respects so with regard to the S.; how he 'testified' against those who were treading wine-presses on the S., and bringing in sheaves, and lading asses, &c., and, further, against those 'men of Tyre' who brought 'all manner of ware, and sold on the Sabbath unto the children of Judah and in Jerusalem.' It is by profaning the S., he urges, that their fathers have caused all the evil and wrath that befell the nation and the city. He had the gates shut from Friday evening to Saturday night, and drove away those merchants who still kept lodging outside, by threats of 'laying hands on them.'

What Nehemiah had reinstituted, seems to have been most rigorously upheld, and in many cases made more binding even than he ever intended it, or, at all events, than the originally promulgated form of his words would seem to imply at first sight. With respect to the S. in particular, we find it not more than 100 years afterwards kept with such severity that the people would not even stir in defence of the city of Jerusalem, stormed by the soldiers of Ptolemy I. on that day. Later still, those who had fled into caves to escape the persecution of Antiochus Epiphanes, allowed themselves to be butchered wholesale, nay, burned alive, without any attempt at flight or resistance; 'because they made a conscience to help themselves for the honour of the most sacred day' (2. Macc. vi. 11). It was only in consequence of these horrible catastrophes, and in consideration of the probability of the enemy's always choosing the hallowed day for his attacks, and thus gradually rooting out the nation, that fighting in self-defence was allowed; although it appears the enemy was not to be disturbed in his siege works. Yet this relaxation in favour of the defensive appears again to have been abrogated through the influence of the fanatical Chassidaic party. Both Pompey and Herod, it would seem, took advantage of the S. for the preparation of the storm on Jerusalem, relying—and successfully—on the strict observance of that day by their antagonists. The incessant tribulations, however, that followed almost without interruption till the final destruction of the Jewish empire, together with the influence of new schools and views, wrought an immense change. Shammai himself, the austere interpreter of the law, and the so-called antagonist of the milder Hillel, pronounced not only the defensive but the offensive legal and righteous (Sabb. xix. a): as, indeed, in his days, human life was placed, under all circumstances whatsoever, higher than any divine or human precept about the Sabbath. 'The Law,' it is said with regard to the S., was given, according to the Scriptures, like other laws, 'that man should *live by them,*' '*not that he should die through them*' (Tos. Shab. xvi. 5). That Joshua had never stopped in his sieges on the S., was not considered so weighty an argument as the dire and imminent necessity that forced itself upon the military and spiritual leaders of the people, of preserving at all hazards a remnant at least of the fast perishing nation.

It was probably after the Exile that the first attempts at legally fixing, or rather 'fencing about' the divine ordinance in a minute and rigorous manner, were made. As we have seen before, no special definition of the 'work' prohibited—save in a few instances—is to be found in the Old Testament. Whether it was the 'men of the great synagogue,' or the later schools, that promulgated the special precepts and prohibitions (part of which were traced to the legislation on Sinai itself (Oral Law)—is difficult to decide. The Mishna only enumerates thirty-nine principal ('*father-*') works, each of which, again, carries a certain number of minor ('*begotten*') works with it, which are strictly forbidden on the Sabbath. A certain portion of these inhibitions and prohibitions refers to work connected with agriculture and the chase; another to domestic labours generally performed by women (such as spinning, sewing, &c.); another again to trades (of builders, mechanics, labourers, &c.) and the like. One of the most harassing of precepts, and one which had at last to be amended by a number of new enactments, was the prohibition of moving things from one place into another (from public to private localities, and *vice versâ*). The minor prohibitions referred chiefly to things which might easily 'lead' to the violation of the S., such as riding on horseback, climbing trees, &c. The 'Sabbath-day's journey,' or prohibition, based on Ex. xvi. 29, of walking more than the supposed utmost space between the ark and the extreme end of the camp, seems to belong, in the Mishnaic form at least, to the Roman times; the *mil* to which it was limited, and which contains the requisite 2000 yards, being a Roman measure.

However it is to be reconciled with the well-known narrative of Christ's healing on the S.-day, contained in the New Testament, there is absolutely no doubt about the fact that, according to the so-called Pharisaical code—i. e., the Oral Law, the highest and absolute authority of Judaism—the safety of life and limb utterly over-rules not only the S., but even the day of Atonement itself. It is only certain smaller alleviations of momentary pain, such as could not by any chance place the patient in the slightest danger, about which we find some kind of casuistical discussions. Practically—that is, according to the final enactments (see Maimonides Yad Chasaka)—it is not only the regard to life, but to the health and well-being of the patient, that sets all Sabbatical prohibitions at nought. The law of 'rest,' according to the Talmud, applies no more to the case of the sick or those anyhow endangered, than it did with regard to the temple, and all the 'work' therein, which, indeed, was much heavier on S. and feast days than at other times. Another difficulty is found in the words in which Christ refers to the beast that is to be taken out of a pit on a S.; the Jewish law ordaining, in reality, that it should be aided in its own efforts, if it endeavoured to get out by itself; if it did not succeed, it should be left there, food being let down to it, until the end of the S. (Luke xiv.; Matt. xii. 11; Sabb. 128 b). Could it be that the common people (the Hediots or Idiots—i. e., the untutored in the law) were ignorant of the real scope and purport of the 'Pharisaical' code, and that the argument was directed against their crude notions, as directly opposed to the law as established? But on this we must not enlarge here. It is also impossible to enter into any of the various ancient and modern ways of looking at the S. in an allegorical and symbolical light, e. g., its being connected by Philo and his school with the planets, the spheres, the number seven and the like mystical notions. Nor can we follow here those speculations which make out a close parallel between the divine work and rest and human work and rest; and shew how well-rounded and entire time itself appears when shaped into a week after the model of the six days of creation, and how man's life is, through it, conformed to that of his Creator.

There can be no doubt about its meaning in the Old Testament. It is intended as a principal testimony of faith in the Creator of the universe. Hence its supreme importance. Though the threatened punishments for S.-breakers never seem to have been carried out to the full during the times of the established commonwealth, in the scheme of Judaism it was placed on a par with the entire body of the Law. He who transgresses the S. is considered legally, according to Maimonides, as one who has set the whole law at defiance, and is to be looked upon in every respect as like a 'worshipper of stars'—i. e., a heathen.

Regarding the development of the positive side of the Sabbatical observance, we have to mention first, that in conformity with the precept making it a day of 'holy assembly,' the synagogue (irrespective of the temple-service, its special sacrifices, prayers, and psalms for the day), assembled the faithful on that day within its precincts in every town and hamlet in and out of Palestine before and after the final Exile. A certain portion of the Pentateuch, to which afterwards was added a prophetical pericope, the Haftarah, was read, translated into the vernacular, and expounded homiletically. Special prayers and psalms, in addition to the ordinary slightly-modified service, with special reference to the sanctity of the S., were said and sung, and the rest of the day was devoted to pious meditation, study in the law, and to serenity and joyfulness. Respecting this last point, it must be borne in mind that the day is distinctly called a *day of joy and delight* (e. g., cf. Ps. xcii., Is. lviii. 13, Hos. ii. 11, 13, &c.—the words in Is. translated in the authorised version by 'doing thy pleasure,' in reality mean 'doing thy work;' the Hebrew word in this passage exactly corresponding to our 'affairs,' 'business,'). A variety of minor regulations referring to bodily indulgences on that day, abundantly prove—if further proof were needed—its recognised character as a 'feast-day' in the natural and general sense of the term, in Judaism. It was to be honoured by the wearing of finer garments, by three special meals of the best cheer the house could afford (fish, meat, &c.); and it was considered a particularly meritorious thing on the part of the master of the house to busy himself personally as much as possible with the furnishing of the viands, nay, the fetching of the very wood for the cooking, so as to do as much honour to the 'bride Sabbath' as in him lay. Wine, if the means of the individual would anyhow allow it, was to crown the repast, special blessings being duly pronounced over it with reference to the holy day, both at its coming in and at its going out. From the circle of the family, this custom of welcoming, as it were, the S., and taking leave of it, with the cup of blessing, with lights, and with spice, found its way at an early period into the synagogue, on account of those strangers who, having to stop on their journey during the twenty-four hours, were often lodged and fed in or near the synagogue, and on whose behalf the blessing had to be pronounced generally. Fasting, mourning, mortification of all and every kind, even special supplicatory prayers, are strictly prohibited; but, on the contrary, the number of 'a hundred benedictions,' said at all varieties of enjoyments of the senses, are to be completed on the S., were it even by eating different kinds of fruit, smelling different spices, &c. Those who study hard during the week are to relax somewhat on that day, while those bent on business all week may indulge more freely in their readings; even school children are to be released from hard lessons on that day. Nay, the Friday itself participated in a manner in the solemnity of the Sabbath. Its very name was sunk in 'Eve of Sabbath.' At an early hour in the afternoon, trumpets were blown from the steps of the temple in Jerusalem; and certain shops, the stopping of whose business required some time, began to close. Again and again the trumpets resounded at certain intervals, and other trades ceased, as, indeed, nothing might even be begun on Friday which could not be finished or stopped at the end of that day: walking also was restricted to a certain extent on Friday, and judgment over life and death was entirely suspended. At last, when the sun disappeared from the horizon—irrespective of the situation of the place, whence a difference arose between the beginning of the S. among the dwellers in valleys or on elevations—the hallowed period commenced, and lasted until three stars were visible in the following evening.

The original formulas, much enlarged in later times, as far as they are to be traced now, of the introductory benediction, as well as the valedictory prayer, both of which we subjoin, show the character and scope of the day in Judaism so fully, that they may stand instead of any further explanation of our own.

1. (Kiddush.) 'Blessed art Thou, O Lord, our God, King of the Universe, who hath sanctified us by His Laws, and hath made us participate in His Grace, and hath, in His Love and in His Mercy, given us the Sabbath, as a remembrance of the

creation, as the first day of Holy Convocations, and in memory of the redemption from Egypt; for Thou hast chosen us and sanctified us from all peoples, and hast given unto us Thy holy Sabbath in Love and in Grace. Blessed art Thou, O Lord, who sanctifieth the Sabbath.'

2. (Habdalah) 'Blessed art Thou, O Lord, our God, King of the Universe, who divided between Holy and Unholy, between Light and Darkness, between Israel and the peoples, between the Sabbath and the six days of creation. Blessed art Thou, O Lord, who divideth between Holy and Unholy.'

The same character of cheerfulness, of happy rest from the toil and turmoil of the world's business; of quiet and peaceful 'return into one's self;' of joyous communion with friends and kindred over good cheer—in short, of mental and bodily relaxation and recreation that strengthens, braces, pacifies, and maketh the heart glad, while the sublime ideas which it symbolises are recalled to the memory at every step and turn—seems to have prevailed at all times, down to our own, among the Jews. Whatever difference there may be in the peculiar customs respecting the S. among some of the recent sects among them, e. g., the Karaites, the Chassidim, &c. (see JEWISH SECTS), they chiefly refer to the Liturgy (with the one vital exception, that the Karaites entirely abstain from the use of light and fire during the whole of the twenty-four hours), and to some minor points, upon which we cannot dwell here. It is also unnecessary here to go into the special 'superior' or 'mourning' Sabbaths during the year, i. e., those that precede or follow certain festivals or days of humiliation, or such as formerly inaugurated new academical semestres (Kallah), and the like. Suffice it to reiterate that in every class, every age, and every variety of Jews, from first to last, the S. has been absolutely a day of joy and happiness, nay, of dancing, of singing, of eating and drinking, and of luxury. The 'luxus Sabbatarius' of Sidonius Apollinarius has indeed been a reproach to them, as was their supposed over-indulgence in laziness. The thinking minds were, according to Philo and others, more than ever busy on that day with those sacred mysteries of God's revelation to man and his miraculous workings on behalf of the 'chosen' nation; others' hearts were lifted up by prayers, by readings, by earnest exhortations, and by pleasing and instructive homiletics. A dark, fanatical, self-torturing spirit is as foreign to the Jewish S. (which is prolonged as far as possible) as it is foreign to the Mosaic and post-Mosaic legislation, its written and oral laws in general.

The benefits of the institution itself for the individual are, after what we have said of its practice, too self-evident to require further comment. How it connected, on the one hand, the human being with the divine Creator, and, on the other, with his fellow-creatures, brother and stranger, children and slaves, nay, the very beast of burden, the ox and the ass—how, ever recurring, it inculcated with irresistible force pious reverence, fear, and love of God, the sole master of all things—man's time and property included—good will to all things created; and the absolute equality of all men—need not be urged here. Proudhon has recently treated on it from the national-economy point of view, and he has come to the conclusion, that the proportion of the six days of work to the one of judicious rest, is one of manifest wisdom, and of great blessing to man.

It is necessary here to say a few words with reference to the notion that the S., i. e., the celebration of the seventh day as a day of rest, is an institution common to all or most of the civilised nations of antiquity (Assyrians, Arabs, Egyptians, Greeks, Romans), from whom Moses has also been charged with having borrowed it. There is no more truth in these statements than there is in the often repeated assertion of an ancient S. among the aboriginal savages. The dicta of Philo and Josephus, to the effect that there was no city, either Hellenic or barbarian, and not a single people, to which the custom of the S. had not penetrated, have absurdly enough been taken by some as a proof that the Jews borrowed the custom. If the number seven [six and one] is one to which a peculiar significance attached at a very early period, in connection with the calendar (compare the seven worlds, the seven continents, the seven seas, &c., of the Indian cosmogony), and if the weekly cycle of seven days which goes back to the ante-Mosaic period (see Gen. xxix. 27, *seq.;* vii. 4, 10; viii. 10, 12, &c.), is, probably, the common property of the Semitic races; yet there is a mighty difference between counting time by seven (the ancient Egyptians had, in fact, a ten days' previous to a seven days' cycle), and making the seventh day a 'day of rest and holy convocation,' with reference to the national life of Israel. There is no special sanctity found attached to the day either with the Egyptians or with the pre-Mohammedan Arabs, who sacrificed on that day in black garments, in a hexagonal black temple, an old bull to Saturn: exactly as they sacrificed a boy on another day of the week, sacred to the planet Jupiter. As for the Greeks, the only authenticated passage we find with reference to the subject, is Hesiod's (*Op. et D.* 770, &c.) reference to the seventh day of the month, sacred to Apollo as other days were sacred to other gods. Other verses quoted by Clemens Alexandrinus and Eusebius, as from Homer and Hesiod, are proved to be spurious Judæo-Hellenic fabrications. The Roman calendar knows absolutely nothing of a hallowed seventh day.

Thus much on the S. under the 'Old Dispensation.' We have still to consider it in relation to the Christian Church, and to trace the progress of opinion and practice in regard to the observance of the first day of the week, which in this country is frequently styled the Sabbath, or, more definitely, the Christian Sabbath.

It is hardly necessary to observe, that all the discourses of Jesus were addressed to Jewish hearers, subject, like himself, to the Mosaic law. That he is nowhere recorded to have enjoined the observance of the S. has by some been thought significant, but seems to have been natural enough in a case where those he addressed, so far from neglecting the duty, were superstitiously scrupulous in its performance. What his hearers needed and received was the lesson, that, the S. having been intended for human benefit, the duty of observing it ought to give way before the higher duty of effecting that purpose, when the two were in conflict; and that trivial acts demanding no exertion were not to be confounded with that real and exhausting labour which was the thing truly forbidden. (Matt. xii. 1—14; Mark ii. 23—28; iii. 1—6; Luke vi. 6—11: cf. Hosea vi. 6; Psal. l. 8—14; li. 16, 17; Is. i. 10—17; Jer. vi. 19, 20; vii. 21—23; 1 Sam. xxi. 6). Some have thought that by making clay on a S. to anoint the eyes of a blind man, and by ordering an invalid, when cured, to carry home his bed on another S., he designed to intimate, if not the present abolition of the S., at least its approaching end. But others look upon the former of these acts as much too trivial to be confounded with 'servile work,' and the latter as an exceptional case within the scope of the principle above stated. On no occasion does he appear to

have sanctioned the performance of real work on the seventh day, unless it was demanded by some higher duty than that of bodily rest.

For several years after the death of Jesus, the Church included none but Jews, and by these the S. and other Mosaic rites continued to be observed as before. It was not till Peter's visit to the centurion Cornelius (41 A. D.) that the Gospel began to be preached to the Gentiles; and when the apostles and elders met at Jerusalem to consider what was to be done with the Gentile brethren, it was decided that no Mosaic burden should be laid upon them beyond abstinence from certain practices, of which working on the S. is not one (Acts xv. 23—29). Nevertheless, the Judaising party continued in various places to demand more or less conformity to the law on the part of the Gentile converts. This party was strenuously withstood by Paul (q. v.), in whose Epistles the dispute is a subject that frequently recurs. From his letters to the churches of Rome, Galatia, and Colosse, which contained both Jews and Gentiles, we learn that, while the Jews wished the Gentiles to observe the Sabbaths prescribed in the law, the Gentiles were prone to treat the observance of Jewish ceremonies with contempt. Upon both parties the apostle enjoins mutual forbearance and respect; forbidding the Jew who esteemed one day above another to disturb the Gentile who esteemed every day alike, and ordering the Gentile to refrain from contemning the observances conscientiously performed by his weaker brother the Jew (Rom. xiv.; Col. ii. 11—17). That he never taught the Jewish Christians to abandon the observance of the law, but, on the contrary, continued to the end to observe it himself—as appears from Acts xxv. 8; xxviii. 17; Philip. iii. 6—are facts of which different explanations have been given by theologians; some thinking that the law continued binding on the Jews, whether Christians or not, so long as the Temple stood; while most are of opinion that conformity to the rooted notions and habits of that people was tolerated for a time, in order that the diffusion of the Gospel might not be impeded amongst them. In the Eastern churches, where the proportion of Jews was greater than in the West, the S. continued to be observed till the 5th c., when we lose sight of the Ebionites (q. v.), a sect of Judaisers such as Paul withstood—and of the more moderate Ebionitic Nazarenes, who, though they conceived it to be their *own* duty to circumcise, keep the S., &c., had no desire to impose the peculiarities of Judaism on the Gentile Christians. Down to the present time, however, S.-keeping and various other Jewish rites continue to be practised along with Christian observances by the Christians of Abyssinia, whose ancestors, it is probable, derived them either (as a tradition among them indicates) from missionaries of the Alexandrian Church, of which many members were Jews, or from expatriated Hebrews who settled in Abyssinia at some much earlier date. In other countries also, many of the Gentile Christians seem to have anciently observed the S., if not by resting the whole day from work, at least by attending on it the religious meetings of their sabbatising Jewish brethren.

Hitherto we have spoken of the observance of *Saturday*, the day of rest prescribed to the Jews, and to which exclusively the name of the S.-day was anciently applied, and still continues to be given by every nation but our own and its offshoots. At what date the Sunday, or first day of the week, began to be generally used by Christians as a stated time for religious meetings, we have no definite information either in the New Testament or in the writings of the Fathers of the Church (q. v.). By none of the Fathers before the 4th c. is it identified with the S., nor is the duty of observing it grounded by them either on the fourth commandment, or on the precept or example of Jesus or his apostles, or on an ante-Mosaic S.-law promulgated to mankind at the creation and continuing in force after the coming of Christ. To the reality of such a law—which many modern Christians have deduced from Gen. ii. 2, 3; iv. 3; vii. 4, 10; viii. 4, 10—12; xxix. 27; l. 10; Ex. xvi. 4—30, and which some (as Bishop Horsley, Serm. 22) regard as an indispensable basis for a Christian S.—it has been objected that the attention of the Gentile converts, who must be supposed to have been ignorant of the law in question, is nowhere found in Scripture to have been directed to it by Paul; that his declarations of their freedom from the observance of days are so general as to apply to every law on that subject, whensoever enacted; that consequently he must either have been unacquainted with a primeval law, or (if not) have regarded it as obsolete under the new dispensation; and lastly, that the Fathers, had they known such a law, would have mentioned it in their writings, instead of vindicating (as Justin, for instance, does in his *Dialogue with Trypho the Jew*) the neglect of S.-keeping by Gentile Christians, on the ground that the S. began with Moses and was not observed by the Patriarchs. By none of the Fathers is any S.-law whatever represented as being in force among the Gentiles.

On what grounds, then, did the Christians observe the first day of the week as a time for religious assemblies?—and how and when did the custom of so distinguishing it begin? To these questions, very different answers have been given. According to some theologians, apostolic precept or example is the only conceivable origin of a custom apparently so general as well as early; and of such *example* at least, they find evidence in John xx. 19, 26; Acts ii. 1; xx. 6, 7; 1 Cor. xvi. 1, 2; and Rev. i. 10. But others, doubting or denying the conclusiveness of this scriptural proof, conceive that an adequate explanation may be found in the circumstances of the primitive Church. That the desire which naturally actuates the members of every new and unpopular religious sect to meet frequently for worship, instruction, and mutual encouragement, might very soon lead to the fixing of stated days for that purpose, may be assumed as self-evident; that a weekly day should be chosen, would be a natural result of the Jewish habits of the earliest Christians; and that the day on which their Lord had risen victorious from the grave should be thought fittest for this weekly festival, is precisely what was to be expected in their circumstances. But the resurrection of Jesus is by no means the only reason assigned by the Fathers for the honour which they paid to the Sunday. By Justin (see JUSTINUS), in whose *Apology for the Christians to Antoninus Pius*, ss. 87—89, written between 138 and 150 A. D., the earliest undoubted mention of Sunday meetings in the works of the Fathers occurs, several reasons for holding them *then* are assigned—the first being, that on this day of the week the world and light were created; and the second being the resurrection of Christ. 'We all of us,' says he, 'assemble together on Sunday, because it is the first day in which God changed darkness and matter, and made the world. On the same day, also, Jesus Christ our Saviour rose from the dead; for he was crucified on the day before that of Saturn, and on the day after that of Saturn, which is that of the Sun, he appeared to his apostles and disciples, and taught them what we now submit to your consideration.' To these reasons, Origen (*Seventh Hom. on Exod.*) adds the fact that manna was first given to the

Israelites on a Sunday; while subsequent writers adduce various other events, either recorded, or by them imagined, to have occurred on that day. In arguing with Trypho, Justin opposes S.-keeping by Christians, on grounds which would have been retorted by the Jew as condemning equally the observance of a first-day S., had the Sunday at that time been regarded as the S.: from which fact, and the circumstance that in his *Apology* already spoken of, where he professes to give the Emperor Antoninus a full account of the observance of the day, no mention is made of rest from labour as a part of that observance, the inference has been drawn, that, except during the time of divine service, the Christians in this Father's age thought it lawful to follow, and actually did follow, their worldly pursuits on the Sunday. It is true that by Tertullian, who wrote in the latter half of the 2d c., the Christians are described as 'putting off even their business on the Lord's day, lest they might give place to the devil' (*De Orat.* c. 23); an indication, in Neander's opinion (*Church Hist.* i. 409, Bohn's ed.), that now the Jewish law of the S. had begun to be applied to the Lord's day. But the soundness of this interpretation has been questioned Dr Hessey. for instance (*Bampton Lectures*, 1860, p. 63), stating that he can find in it 'nothing Sabbatarian nothing, in fact, more than I should have expected, considering that the Church had now become somewhat settled that, rather than that the duties peculiar to the Lord's day should be neglected, worldly business was put off to another day.' But whatever may have been the opinion and practice of these early Christians in regard to cessation from labour on the Sunday, unquestionably the first law, either ecclesiastical or civil, by which the sabbatical observance of that day is known to have been ordained, is the edict of Constantine, 321 A.D., of which the following is a translation: 'Let all judges, inhabitants of the cities, and artificers, rest on the venerable Sunday. But in the country, husbandmen may freely and lawfully apply to the business of agriculture; since it often happens that the sowing of corn and planting of vines cannot be so advantageously performed on any other day; lest, by neglecting the opportunity, they should lose the benefits which the divine bounty bestows on us' (*Cod.* iii. 12, 3). Before this time, such of the Christian writers as had endeavoured, by a mystical style of interpretation, to turn the Mosaic ceremonies to account as sources of moral and religious instruction, had, probably in imitation of Philo (q. v.) (*Works*, iii. 265, Bohn's ed.), spiritualised the law of the S. to the effect of representing it as a mystical prohibition to the Christian of evil works during all the days of his life, and a prefiguration of the spiritual repose and enjoyment which is his portion both in this world and in the next. But in addition to this significance, there now began to be discovered in the Old Testament, foreshadowings of the new Sunday-S.; and Eusebius (q. v.), bishop of Cæsarea, the friend and biographer of Constantine, was able to descry in Ps. xlvi. 5, and lix. 16, prophetic allusions to the *morning* assemblies of Christians on Sundays for worship, and in Psal. xxii. 29 a prefiguration of the weekly celebration of *the Lord's Supper* on that day. Applying Ps. xcii. to the first day of the week, the same writer says that 'the Word, by the New Covenant, translated and transferred the feast of the Sabbath to the morning light, and gave us the symbol of true rest—viz., the saving Lord's Day, the first of the light,' &c. From other passages in Eusebius and subsequent writers, it is plain that they meant, not that this transference had been formally ordained by Christ (of which there is no trace in Scripture), but that by rising from the tomb on the first day of the week he had made that day more illustrious than the S., and more worthy to be celebrated by the holding of Christian assemblies for worship than the S. was to be similarly honoured by the Jews. About the end of the 4th c., Chrysostom is found similarly expounding Gen. ii. 3, which, in his opinion, shews that already from the beginning God offered us instruction typically, teaching us to dedicate and separate the one day in the circle of the week wholly to employment in things spiritual—thus (as his translator observes) making the S. a *type* of the Lord's Day, and rest *from* bodily, of rest *in* spiritual work. (*Library of the Fathers*, ix. 209.)

It was a natural result of Constantine's law, backed by such interpretations of the Old Testament as these, that, in the words of Dr Hessey, 'a new era in the history of the Lord's Day now commenced; tendencies towards Sabbatarianism, or confusion of the Christian with the Jewish institution, beginning to manifest themselves. These, however, were slight, until the end of the 5th century, and are traceable chiefly to and in the civil legislation of the period. Afterwards they developed themselves more decidedly; Sabbatarianism became at length systematised, in one of its phases, in the ante-Reformation Church both in England and on the Continent by the later Schoolmen, probably in their desire to lay down exact rules for consciences, and under a fancied necessity of urging the precedent of Jewish enactments in support of Christian holy-days' (p. 20). But it was not till the year 538 that abstinence from agricultural labour on Sunday was recommended, rather than enjoined, by an ecclesiastical authority (the third council of Orleans), and this expressly 'that the people might have more leisure to go to church, and say their prayers;' nor was it till about the end of the 9th c., that the Emperor Leo, 'the Philosopher,' repealed the exemption which it enjoyed under the edict of Constantine (Leo, *Const.* 54). And now, the Lord's Day being thoroughly established by law as a S., the fourth commandment would more than ever be employed by the clergy as a means of persuading to its observance. The entire Decalogue, indeed, had long been used by them as a convenient summary of human duty; and by the later Schoolmen it came to be represented as, to a certain extent,—i. e., so far as it coincided with the law of nature—actually *obligatory* on Christians. This theory of its binding force, and the notion of the holiness of days, were vigorously opposed by Luther and the other Reformers, who denounced also the excessive multiplication of festivals, and proclaimed that the pardon of sin was not to be secured by their observance, or otherwise than by faith in Christ. (See Luther's *Larger Catechism;* the *Augsburg Confession*, 1530, c. vii.; Calvin's *Institutes*, b. ii. ch. viii. ss. 28–34; and his other writings on the subject, collected by R. Cox in *The Whole Doctrine of Calvin about the Sabbath and the Lord's Day*, Edin. 1860). But, while condemning everything which they viewed as abuses and corruptions, the Reformers never ceased to acknowledge the manifold utility and high importance of the Sunday as a day of rest, worship, and decorous enjoyment. Like the later Fathers and the Schoolmen, also, they recognised in the fourth commandment a useful means of instruction and exhortation; but, as we have said, they utterly rejected it as a law. 'The Ten Commandments,' says Luther, 'do not apply to us Gentiles and Christians, but only to the Jews.' (*On the Ten Commandments.*) 'A law,' says Grotius, 'obliges only those to whom it is given; and to whom the Mosaic law is given, itself declares: "Hear, O

Israel.'" (*De Jure Belli et Pacis*, lib. i. c. i. s. 16.) He quotes also Deut. iv. 7. and Ps. cxlvii. 19, 20. This is not Antinomianism (q. v.): the Reformers acknowledged their subjection not only to the more perfect law of Christ, but to that universal and perpetual law which Paul (Rom. ii. 14) speaks of as the light to the Gentiles of old, who, 'not having the law, were a law unto themselves, shewing the work of the law written in their hearts.' See ETHICS.

The distinction, however, between Moses as a lawgiver and Moses as a teacher, was one very apt to be overlooked by the multitude, and disregarded in popular discourses by the clergy themselves. In England, where the writings of the Reformers were less studied than in Germany, the response after the fourth commandment in the Liturgy (where the Decalogue, adapted to general use by the omission of the words addressing it to the Jews, was inserted in 1552), 'Lord, have mercy upon us, and incline our hearts to keep *this law*,' must have greatly tended to instil the belief that this commandment imposed on them the duty of keeping, not a mystical, but a literal Sabbath. Accordingly, in the reign of Elizabeth, it occurred to many conscientious and independent thinkers (as it had previously done to some Protestants in Bohemia), that the fourth commandment required of them the observance, not of the first, but of the specified *seventh* day of the week, and a strict bodily rest as a service then due to God; while others, though convinced that the day had been altered by divine authority, took up the same opinion as to the Scriptural obligation to refrain from work. The former class became numerous enough to make a considerable figure for more than a century in England under the title of 'Sabbatarians'- a word now exchanged for the less ambiguous appellation of 'Seventh-day Baptists.' The other and much larger class were the Puritans (q. v.), who, justly offended by the vices and frivolity of the times, but also soured by persecution, applying to themselves the threats of Jehovah against the profaners of the token of the covenant between him and his chosen people—led astray by the mistranslation of Is. lviii. 13 above noticed—overlooking the incidents in Luke xiv. 1—12—and giving a narrower scope than the Reformers had done to the teaching of Paul - added to Sunday-keeping an austerity by which neither it nor the S.-keeping of the Jews had ever before been marked. (See ASCETICISM.) This great party, when predominant for a time in the reign of Charles I., availed themselves of the opportunity to maintain and spread their Sabbatarian opinions, not only in numerous treatises, but through what has proved to be the more lasting and influential means of the *Westminster Confession* and *Catechisms*. (See ASSEMBLY OF DIVINES; CATECHISMS; CREEDS AND CONFESSIONS.) Chiefly through these formularies was effectually introduced into Scotland that scrupulous abstinence from recreation as well as business on Sunday, which still distinguishes the people. For it is a mistake to suppose that either Sabbatarianism or asceticism was recommended by Knox. Agreeing with the other Reformers, Knox, in setting forth in his *Confession of Faith* (1560) 'the works of the First Table,' says not a word about the Sabbath. This *Confession* and the *Geneva Catechism* were adhered to in Scotland till superseded in 1648 by the Westminster standards of faith. Nor is it only to the British Presbyterians that the opinions and habits of the Puritans have descended; as the colonists of New England they planted in that distant soil the rigid Sabbatarianism which still survives in Massachusetts and Connecticut, and retains the Jewish peculiarity (which found its chief advocates in Prynne and Shepard, 1655) of being observed from sunset to sunset. In America, too, exists now the principal remnant of the Seventh-day Baptists. (See Rupp's *Relig. Denom. in the United States*, pp. 70—111; Mrs Davis's *History of the Sabbatarian Churches*, Philad. 1851; and the publications of the American (Seventh-day) Sabbath Tract Society, New York, 1852, &c.) They have nearly disappeared in England, though in the 17th c. so numerous and active as to have called forth replies from Bishop White, Warren, Baxter, Bunyan, Wallis and others.

In Holland, though some English Puritan settlers gave birth to a controversy which, during the greater part of the 17th c., engaged the pens of many of the most eminent divines (among whom were Gomarus, Walæus, Rivetus, Coccejus, and F. Burmann), the principles of the Reformers, favoured by Grotius among the laity, ultimately kept their ground, as they have done also in Protestant Germany. Yet in Holland were produced the two bulkiest defences of Sabbatarianism that have ever been published—one, in Latin, by John Brown, an expatriated Scotchman who had been minister of Wamphray, entitled *Causa Dei contra Anti-Sabbatarios* (2 vols., Rotter. 1674 -1676); and the other, in Dutch, by his friend James Koelman, on *The Controversy, History, and Manner of Observance of the Sabbath and the Lord's Day* (Amst. 1685).

In England the earliest considerable treatise on the Puritan side was the *Sabbathum Veteris et Novi Testamenti* of Dr Nicolas Bound, a minister in Suffolk (Lond. 1595; 2d ed. 1606). It is written in English, though the title is partly Latin. Many converts were made by it and the similar works of Greenham and Widley, his contemporaries; but till the heterodoxy of the Seventh-day Baptist Brabourne aroused, in 1632, the indignation of the bishops, little noise seems to have been made throughout the nation by the controversy; nor would it, perhaps, have ever attained much prominence, had not Charles I. committed, in 1633, the blunder, and, as the Puritans believed, the gross impiety, of reviving his father's *Declaration concerning Lawful Sports to be used [on Sundays]*. (See SPORTS, BOOK OF.) This the clergy were required by Laud (q.v.) to publish in their churches, and many who refused were punished severely. Hence arose the greatest English controversy about the S., between the High-Church party on the one hand, and the Puritans on the other. Bishop White (*Treatise of the Sabbath-day*, 1635) and Dr Heylin (q.v.) (*History of the Sabbath*, 1636) took the lead for the former, and were ably supported by Sanderson (*A Sovereign Antidote against Sabbatarian Errors*, 1636), Ironside (*Seven Questions of the Sabbath briefly Disputed*, 1637), Taylor (*Holy Living*, ch. iv. s. 6, and *Ductor Dubitantium*, b. ii. ch. ii. rule 6, ss. 43—62), and Bramhall (*On the Controversies about the Sabbath and the Lord's Day*, in his *Works*, fol. p. 907). On the Puritan side were Henry Burton (*The Lord's Day the Sabbath-day*, 1636), John Ley (*Sunday a Sabbath*, 1641), Hamon L'Estrange (*God's Sabbath before the Law, under the Law, and under the Gospel*, 1641), Richard Bernard (*A Threefold Treatise of the Sabbath*, 1641), William Twisse, prolocutor of the Westminster Assembly (*Of the Morality of the Fourth Commandment, as still in force to bind Christians*, 1641), and jointly Cawdrey and Palmer, two members of the same Assembly, in their *Sabbatum Redivivum, or the Christian Sabbath Vindicated* (2 vols. 1645—1652), which is the most elaborate defence of Sabbatarianism in our language. A still more eminent writer on that side, and one of greater breadth of view, was Dr John Owen, whose

Exercitations concerning a Day of Sacred Rest (1671), since prefixed to his *Exposition of Hebrews*, gave, however, some offence to his friends by suggesting that the duration of the religious exercises of the day should be measured by the strength of the worshipper. Since then, the Sabbatarian cause has been maintained by numberless writers, among whom may be mentioned Bishop Hopkins, Willison, Jonathan Edwards, Dwight, Stopford, Macfarlan, and others to be afterwards named; while the opposite side is supported by Baxter, Milton, Barrow, Barclay, Morer, Michaelis, Paley, Evanson, Higgins, &c.

In the first half of the reign of George III., the comparative neglect into which the observance of the Lord's Day had fallen in England aroused the anxiety of its friends, and many efforts were made to bring the people to a better disposition towards it. Paley did excellent service, especially by his chapter on the use of Sabbatical Institutions (*Moral Philosophy*, b. v. ch. vi.); while Bishop Porteus successfully exerted himself to check open indulgence in vicious and unseemly amusements. About the same time, the new 'Evangelical' party (q. v.) began those efforts which it continues to make for the promotion of a strict observance of Sunday according to the Puritan model. But what, perhaps, had most effect in turning the current of public opinion in that direction was the substitution of the Decade (q. v.) for the Week, and the abolition of public worship, by the National Convention of France in 1793 (see CALENDAR); proceedings which brought to the aid of the pious advocates of the Lord's Day the political conservatism and anti-Gallican feelings of the British people. In the next generation, the revival of the study of ancient Christian literature led to fresh advocacy of the Lutheran views concerning the S. and the Lord's Day, by Bishop Kaye (*On Justin Martyr*, 1829), Dr Whately (*Thoughts on the Sabbath*, 1830), Mr Bannerman (*The Modern Sabbath Examined*, 1832), and the Oxford 'Tractarians;' while Sabbatarianism had influential advocates in Bishop Mant (*The Christian Sabbath, its Institution and Obligation*, 1830), Dr Daniel Wilson, afterwards Bishop of Calcutta (*The Divine Authority and Perpetual Obligation of the Lord's Day Asserted*, 1830), and Dr Ralph Wardlaw (*Discourses on the Sabbath*, 1832)—in support of whose principles was founded in 1831 the London 'Society for Promoting the Due Observance of the Lord's Day,' which, aided by similar associations in Scotland and the United States, still keeps a jealous watch on behalf of the institution. For 17 years preceding his death in 1849, its most noted member, Sir Andrew Agnew, M.P. for Wigtownshire, fought indefatigably both in and out of the House of Commons for a stricter legal enforcement of rest on Sunday; and though he failed to get his bill passed, the agitation which he headed was not wholly fruitless. The attempts, however, which he and his friends have made to suppress all post-office action on Sunday, all stated conveyance of passengers on railways, and such recreations as walking in public gardens, listening to music in the London parks, and viewing works of nature and art in the national collections, have seemed, even to many friends of the institution, to display more zeal than wisdom or knowledge, and have led to the formation (in 1855) of 'The National Sunday League,'—a society which, while deprecating the conversion of any part of the day into a season for ordinary labour, or for frivolous or vicious amusement, conceives that a more cheerful mode of spending some of its hours is expedient, and that the opening of public gardens, museums, and galleries of art, would promote alike the health and the moral and intellectual elevation of the people.

In France, where the Week was restored by Napoleon I. in 1806, the Sunday has not yet wholly recovered its former status as a day of rest; but efforts have lately been made by both clergymen and laymen to convince the people of the advantage of suspending all but necessary labour upon it. Among the advocates of this reform are Pérennès, Gaume, and Mullois, who, however, discountenance the austerity of the Puritans. In Switzerland, Mellet, the pastor of Yvorne, is the author of a clever treatise on *Sunday and the Sabbath*, of which there is an English translation (Lond. 1856). Bred a Sabbatarian, he was converted to the Dominical view by reading Dwight's Sabbatarian *Discourse on the Perpetuity of the Sabbath*, a doctrine still upheld by the 'evangelical' party in Switzerland.

Of late years the bearing of geological discovery on the interpretation of the Hebrew narrative of the creation, and consequently on the S. controversy, and, in particular, on questions arising out of the discrepance between the two copies of the fourth commandment, has been largely discussed. See GENESIS; DECALOGUE. Into the merits of this and other disputed points it is impossible to enter here; but, in concluding the present historical sketch, it may be allowable to express the satisfaction with which we observe, that notwithstanding the wide diversity of opinion as to the authority of the Lord's Day and the manner in which it may and ought to be spent, almost all agree in esteeming it highly as a civil institution at least, and in wishing to defend it from the intrusion of business as far as the public good will allow. —For additional information and discussion, see (on the Sabbatarian side) Holden's *Christian Sabbath* (Lond. 1825); *Report from the Select Committee of the House of Commons on the Obs. of the Sabbath-day* (Sir A. Agnew's committee), 6th August 1832; Jordan's *Scriptural Views of the Sabbath of God* (Lond. 1848); M'Crie's *Memoirs of Sir A. Agnew* (Edin. 1850); Pirret's *Ethics of the Sabbath* (Edin. 1855); Fairbairn's *Typology of Scripture* (3d ed., Edin. 1857); J. Gilfillan's *Sabbath viewed in the Light of Reason, Revelation, and History, with Sketches of its Literature* (Edin. 1861): and (on the Dominical side) Arnold's *Sermons*, vol. iii. (Lond. 1844), and his *Life* by Stanley, 5th ed. vol. i. p. 364, and vol. ii. p. 206; Neale's *Feasts and Fasts* (Lond. 1845); Sir W. Domville's *Examination of the Six Texts commonly adduced from the New Testament in proof of a Christian Sabbath* (Lond. 1849); Hengstenberg on *The Lord's Day*, translated by J. Martin (Lond. 1853); F. D. Maurice's *Sermons on the Sabbath-day* (Lond. 1853); R. Cox's *Sabbath Laws and Duties* (Edin. 1853); Domville's *Inquiry into the supposed Obligation of the Sabbaths of the Old Testament* (Lond. 1855); *Sunday the Rest from Labour*, by a Christian (Lond. 1856); Dr W. F. Hook on *The Lord's Day* (Lond. 1856); *Time and Faith* (Lond. 1856); Alford's *Greek Testament with Commentary* (Lond. 1856—1861); F. W. Robertson's *Sermons*, 1st and 2d series (Lond. 1856); Baden Powell's *Christianity without Judaism* (Lond. 1857); Reichel's *Lord's Day not the Sabbath* (Dubl. 1859); W. Logan Fisher's *Hist. of the Institution of the Sabbath-day, its Uses and Abuses*, 2d. ed. (Phila. 1859); Dr J. A. Hessey's *Sunday; its Origin, History, and present Obligation*, being the Bampton Lectures for 1860; and the *Edin. Review* for October 1861, p. 535. Of the British Seventh-day Baptists the principal works are those of Brabourne (1632), F. Bampfield (1677), Cornthwaite (1740), and Burnside (1825). The Roman Catholic doctrine respecting the Lord's Day, is amply stated in *The Catechism*

of the Council of Trent (1567), Part III., pp. 351—357, 391—403 of the English transl. (Lond. 1852). As to all shades of opinion, see R. Cox's *Literature of the Sabbath Question* (2 vols. Edin. 1865). Proudhon's work, above referred to, is entitled *De la Célébration du Dimanche considérée sous les Rapports de l'Hygiène Publique, de la Morale, des Relations de Famille et de Cité* (Paris, 1850).

SABBATHAIS ZWI, one of the most remarkable 'Messiahs' of modern times, the founder of a wide-spread sect of semi-Christians and semi-Jews throughout Europe, Asia, and Africa, was born at Smyrna in 1641. A boy of extraordinary gifts, he had at the age of 15 already mastered the Talmud, and at 18 was an adept in the mysteries of the Cabbala. Very soon incited by fantastic dreams and more fantastic friends, he declared himself to be the Messiah, who had been sent to shake off the thraldom both of Christianity and Mohammedanism from the Jews, and to convert all humanity. The supreme rabbinical council thereupon excommunicated him. He, however, continued to preach his 'mission' as before. He was now declared an outlaw, and his death was decreed, yet nobody dared to touch him. At last, his expulsion from Smyrna was resolved upon by the municipal authorities. Four apostles—one of them a reconverted Jew, who had previously turned Christian—followed him on his way to Saloniki, where he arrived in 1659, having gathered a vast number of disciples, mostly wealthy, on his road. His extraordinary personal beauty and his fiery eloquence soon brought the most influential Jewish inhabitants on his side, and his cabbalistic formulas and prayers were adopted into the ritual of their synagogue. Two years later, however, he had to leave Saloniki, where powerful antagonists had risen in the meantime, and went first to Palestine and soon after to Alexandria, accompanied by several thousand disciples. Here his power and influence grew so rapidly, that the revenues of the commonwealth to be founded by the new Messiah, and the ways and means of supporting the wars he was going to wage, were seriously taken into consideration. In 1661, no fewer than about 80,000 people belonged to the new empire; and in the following year, the beginning of the Messianic reign within a few months, and the rebuilding of the Temple in the next year, were proclaimed aloud in the streets of Alexandria by S. and six disciples, all clad in white raiments, with garlands on their heads. Somewhat later, he returned to Jerusalem; and the resurrection, to take place within six years, and the deposition of the sultan, whose crown would be placed upon S.'s head, were proclaimed far and near. Upon this all the Jews of Asia, Africa, and Europe, were divided into two camps. Those who believed, finding all the predicted signs fulfilled now, sold everything they had in order to get ready-money for their journey to, and final abode in, the new capital, Jerusalem; others, and among them some of the highest spiritual authorities, declared all the pretended Messiah's miracles to be cabbalistic tricks, and himself an impostor. Returned to his native place, Smyrna, he was received with full royal honours. Meanwhile, the attention of the Divan was drawn to this movement, and Mohammed IV., then in Adrianople, ordered the grand vizier to secure the person of S., and to commit him to prison, until the investigations set on foot should be concluded. Two agas, however, returned with their janizaries, without having effected the order, not having dared 'to stretch forth their hand against the sacred man.' He now offered to surrender voluntarily. He was committed as prisoner of state to Kuthajah, where he received visits and deputations from all parts. Being at last brought before the sultan, his courage failed him, and he declared himself to be nothing more than a simple rabbi: it was only his disciples, he averred, who had called him a Messiah. The sultan then proposed to test his 'mission.' Three poisoned arrows were to be shot at him. Did these prove harmless, he, the sultan, would at once range himself under his flag. In speechless terror, S., at the instigation of his Jewish interpreter, now took the turban from the head of some official, and placed it upon his own, thereby indicating, as the interpreter declared, that his sole object had been all along to embrace Islam, and to carry over all the Jews with him. The sultan declared himself satisfied, and honoured him with the title of an effendi, giving him an honorary post at the same time.

But, extraordinarily enough, the movement was far from having reached its end. The most wonderful stories were circulated among the believers. A fictitious man was supposed by some to have embraced Islam, while the real Messiah had ascended heavenwards. Others believed that Islam was to form part of the new religion; and S., countenancing this view, converted many Jews to Mohammedanism. Nathan, one of his most enthusiastic disciples, travelled about, and caused strife without end, even sanguinary revolts. Many, however, had turned from him by this time, and the voices of the rabbis and their excommunications began to tell more forcibly. Finally, the grand vizier was persuaded to imprison S. once more, and to send him to Bosnia, where he died in a prison in Belgrade—according to some, in consequence of poison, while according to others he was executed in 1677, ten years after his conversion. It is very difficult to judge correctly of a character like his. Even his worst enemies never had a word to say either against his morality or against the extraordinarily brilliant powers of his mind, and his erudition. Probably, he was a self-deceiver, whose plans were not measured by the means in his hands for their execution. His death, however, was only the signal for the reinforcement of his sect, which even many of his former antagonists now joined, and which now, for the first time, was developed into a proper religious system—that of the Sabbathaites or Sabbathians (Shebsen), the chief apostles being Nehemiah, previously a bitter enemy of S. (1677—1690), and Nehemiah Hajun (1708—1717). The latter taught the dogma of the Trinity as part of the new faith; and it became a principle of this religion to accept and to modify itself to the dominant creed of the country—Islam in the East, Christianity in the West. Remnants of it are still in existence in Poland and Turkey. See JEWISH SECTS.

SABBA'TIA, a genus of plants, of the natural order *Gentianaceæ*, natives of North America. They are small herbaceous plants, some with simple, and some with branched stems. They all contain, like many others of the same order, a pure bitter principle, on account of which they are useful in intermittent fevers and as a tonic. They are much employed in the United States.

SABBA'TICAL YEAR (Heb. *Shenath Shabbathon, Shebiith, Shemittah;* Gr. *Hebdomatikos* or *Sabbatikos eniautos*). There are four special injunctions found respecting the celebration of it in the Pentateuch. The first (Exod. xxiii. 10, *seqq.*) ordains that the land, after being sown, and its fruits reaped for six years, should be left to itself in the seventh, so that the poor, and the beasts of the field should eat its spontaneous growth. The same is to be the case with the vine and olive-yards.

The second (Lev. xxv. 2—7) views the hallowed period as a 'Sabbath of rest unto the land'—as a solemnity in honour of Jehovah. It is there further enjoined, that the growth of the seventh year be 'meat' both for proprietor, servants, and strangers; that, in fact, it should be common property. A somewhat new significance, but strictly analogous to the first named ordinance, is given to the institution in the third passage (Deut. xv. 1—11), in which the creditor is enjoined to release the debts owing to him by his poor brother and neighbour. It has been matter of much dispute whether this 'release' implies the entire giving up of the debt, or a mere respite. The Mishna decides in favour of the former; and such were the effects of the law, carried out in accordance with this view, that it was found necessary utterly to paralyse it by an act called the *Prosbul* (Gr. Prosboulé), passed by Hillel the Great. The fourth passage (Deut. xxxi. 10—13) contains the command to read, in the solemnity of the year of release in the 'Feast of Tabernacles,' the Law before all the people in holy convocation, men, women, children, and strangers. We need only remark here that the fundamental idea of the sabbatical year is identical with that of the weekly Sabbath itself; see also JUBILEE, the highest exaltation, as it were, of the idea of sabbatical rest. As to the practical working of the institution, we learn that it gave rise repeatedly to famine (1 Macc. vi. 49, 53; Jos. *Ant.* xiv. 16, 2, &c.), and that it was altogether so fraught with practical difficulties, that from the time it is supposed to have been inaugurated—viz., fourteen years after the Israelites' first entry into Palestine (seven years' conquest, and seven years' division of the land), it never seems to have been kept before the Exile. It has erroneously been supposed by some that the slaves were set free in the sabbatical year. The passage in question refers only to the seventh year of the individual slave's service. Like the jubilee, it was proclaimed on the tenth day of the seventh month, at the end of the harvest-time. Reasonable doubts have been expressed regarding the 'possibility' of the Jubilee (q. v.) ever having been kept in reality; yet there is no doubt about the rigour with which the sabbatical year was kept up, after the Exile, to a very late period. Alexander, Cæsar, and the late emperors exempted the Jews from tribute during it. The sabbatical year being one of the 'ordinances attached to the land'—i. e., Palestine only—it ceased with the final overthrow of the Jewish commonwealth.

SABBIONETTA or SABBIONETA, a city of Northern Italy, province of Cremona, with 6623 inhabitants (census of 1862, while previous to that it numbered 7036). It is situated in a marshy district, which affords abundant fodder and pasturage. It was at one time a place of some consequence; now it is a decayed city, the population of which is daily decreasing.

SABELLIUS, a celebrated African heresiarch of the 3d c., was born probably at Ptolemais in the Pentapolis, where, at all events, his opinions were first promulgated. Nothing is known regarding his life—the few statements current on the subject being of a contradictory and untrustworthy character, and it is generally thought that he did not broach his heresy till shortly before his death—the date of which is also unknown. S. is pronounced by Neander 'the most original and profound thinker among the Monarchians'—i. e., the Unitarians; but unfortunately only a few fragmentary notices of his teaching have been preserved, and these by his theological adversaries. It would appear that he did not reject the Scriptural phraseology used in speaking of the Godhead. 'Father,' 'Son,' and 'Holy Ghost' were sacred and venerable names to him as well as to orthodox Christians; but he was strongly opposed to the ecclesiastical conception of this Trinity, as a Trinity of distinct persons, or subsistences (*hypostases*), which he (like many other persons since) held to be absurd and unthinkable, and argued that what is to be understood is a Trinity of manifestation. The single absolute Divine Essence—the *monas* or 'pure Deity,' unfolds itself in creation and the history of man as a Trinity. His words, as quoted by Athanasius, are: *He monas platuntheisa gegone trias.* The 'energy' by which God called into being and sustains the universe is the 'Logos,' after whose image men were created; but when they had fallen from perfection, it became necessary for the 'Logos,' or Divine Energy, to hypostatise itself in a human body, in order to raise and redeem them; hence in the man Christ Jesus dwelt the fulness of the Godhead *bodily;* while the same Divine Energy, operating spiritually and impersonally in the hearts of believers, is the 'Holy Ghost.' This is not, perhaps, so very heretical after all. But, on the other hand, we must not overlook the fact, that S. held these Divine 'manifestations' to be merely temporary, and that after the 'Logos' and the 'Holy Ghost' had done their work, they would be reabsorbed in the absolute Deity—the *trias* would again resolve itself into the *monas;* or, in the language of St Paul, that 'God would be all in all.' Epiphanius alleges that S. derived his system from an apocryphal 'gospel to the Egyptians;' and there are (as Neander points out) so many points of resemblance in Sabellianism to both the Alexandrian Jewish theology in general, and the particular gospel referred to, that the statement may be regarded as at least indicating the direction from which proceeded the influences that determined the theosophy of the unknown Pentapolitan. The followers of S. were formally suppressed by the Catholic Church in the 4th c.; but his doctrine, which, divested of its Gnostic and Neo-Platonic phraseology about 'emanation' and 're-absorption,' &c., is substantially Unitarian, has seldom wanted eminent advocates in any subsequent age of Christianity.—Consult Tillemont's *Memoirs;* Lardner's *Credibility of the Gospel;* and the Church Histories of Mosheim, Neander, and Milman.

SABICU (*Acacia formosa*; see ACACIA), a tree the wood of which is remarkably hard and tough. It is a native of Cuba. The wood is of a dull red colour, and close short grain. The wood was used to construct the stairs of the Crystal Palace in Hyde Park in 1851, and 'after six months' use, the steps hardly exhibited any signs of wear.'

SABINE, MAJOR-GENERAL EDWARD, a celebrated British physicist, is of Irish extraction, and was born in 1790. After serving in the royal artillery for some time, he was promoted to the grade of lieutenant, and accompanied Captain Ross (q.v.) and Lieutenant Parry (q. v.) in their expedition (1819—1820) to the north coast of America (see NORTH-WEST PASSAGE), making during the voyage a series of magnetic observations of great value. These observations formed the substance of two papers which he communicated to the Royal Society on his return. A strong desire of continuing the investigation of this and other branches of experimental physics, prompted him to undertake a series of voyages to places between the equator and the north pole, making at each point observations on the length of the seconds pendulum, and on the dip and intensity of the magnetic needle. The fruits of these labours were of high importance, and were published, along with other information, in 1825.

From this period, his history is that of a studious investigator into the laws and phenomena of nature, broken only by a short term of military service in Ireland, during which he rose to the rank of major. In 1836 he communicated to the British Association at Bristol his observations on the declination and intensity of the magnetic force in Scotland; and to the same association, he delivered, at Liverpool, in 1837, a report on the variations of magnetic intensity at different parts of the earth's surface. The rest of his researches into the nature and action of magnetic force will be found in detail in the *Transactions* of the above-mentioned association, of the Royal Society, and in the *Philosophical Transactions*. His labours have led to the discovery of the laws of 'magnetic storms,' of the connection between certain magnetic phenomena and the changes of the solar spots, and of the magnetic action (independently of heat) of the sun and moon on the earth. He deserves almost the sole credit of extending the body of known facts in magnetic science by the establishment of magnetic observatories in all parts of the world, and by the collation of the enormous mass of facts thus acquired. In 1818, S. was elected a Fellow of the Royal Society; on the retirement of Mr George Rennie (q. v.) in 1850, he became its Vice-president and Treasurer, and President in 1861. In 1852, he presided over the meetings of the British Association at Belfast, and has for a series of years been the general secretary of this association. In 1856, he was raised to the rank of major-general of artillery and engineers.

SABI'NE, a river of the United States of America, rises in the north-eastern part of Texas, and flows south-easterly 250 miles to the eastern boundary of Texas, whence flowing southerly, it forms the eastern boundary, and empties itself through Sabine Bay, 18 miles long by 9 miles wide, into the Gulf of Mexico. The S. is 500 miles long, but shallow and unnavigable.

SABI'NI, an ancient people of Central Italy, whose territory lay to the north-east of Rome. The boundaries of the territory cannot be determined with exactness, but it appears to have extended from the sources of the Nar, on the borders of Picenum, as far south as the Anio. The nations conterminous to the S. were the Umbrians on the north, the Umbrians and Etruscans on the west, the Latins and Æqui on the south, and the Marsi and Picentini on the east. The entire length of the Sabine territory did not exceed 85 miles, reckoning from the lofty and rugged group of the Apennines, anciently known as the *Mons Fiscellus* (now *Monti della Sibilla*), to Fidenæ on the Tiber, which is not more than 5 miles from Rome. The principal towns were Reate, Interocrea, Falacrinum, Nursia, Amiternum, Casperia, and Cures, but none of these places were of any size or political importance. The inhabitants had no inducements to congregate in large towns. Their country was an interior region; much of it, especially in the north, very mountainous and bleak, though the valleys were (and are) often richly productive; and thus cut off from the seaboard, and even from that easy access to their neighbours which lowland districts admit of, they (like all the other races who peopled the sequestered regions of the Apennines) scarcely advanced beyond the rude simplicity of their primitive highland hamlets. The Sabines were a brave, stern, religious race, whose virtues were all of an austere and homely character. Cicero speaks of them as *severissimi homines*, and Livy notes the *disciplina tetrica ac tristis veterum Sabinorum* ('the stern and grave discipline of the old Sabines'), while the poets of the Empire—Horace, Virgil, Juvenal, &c., are fond of contrasting their simple uncontaminated modes of life with the vicious luxury and dissipation of the capital. What part, if any, they had in the foundation of the city of Rome, cannot now be ascertained, as the whole story of the Ramnes, Tities, and Luceres has come down to us in a purely mythical form (see ROME). Their native tutelary deity was 'Sancus,' or 'Semo-Sancus' = Lat. *Sanctus*, the 'Holy' or 'Venerable;' but like the other Latino-Sabellian races, they also worshipped Jove, Mars, Minerva, Sol, &c. That the S. were an ancient people in Italy, is certain. They were probably most nearly allied to the Umbrians, whose tutelary god was also 'Semo-Sancus;' and, in fact, they are generally considered an offshoot of that people; but they themselves, on the other hand, became so numerous that they were obliged to send forth numerous colonies, who founded new nations to the south and east, the Picentes, Peligni, Samnites (q. v.) &c.; while the Samnites (a name essentially the same as *Sabini;* the Greek form *Saunitai* = *Sav-nite* = Oscan name *Safini* or *Sabini*) in their turn became the progenitors of the Lucanians, Campanians, and Bruttii. Hence the epithet, *Umbro-Sabellian*, in use among classical ethnologists, to denote the whole of these kindred races, who were also allied, but less closely, to the Latins (see LATINI) and Oscans (see OSCI). Of the Sabine language, only a few words remain, which, however, seem to indicate that it differed from the Latin only dialectically: thus, Lat. *hircus*, Sab. *fircus;* Lat. *hostis*, Sab. *fostis*, &c.; analogous to the Aberdeen *filk* for 'whilk,' *fat* for 'what,' &c. For further information, see ROME, HISTORY OF.

SABLE (*Martes zibellina*), a species of Marten (q. v.), so nearly allied to the Common Marten and Pine Marten, that it is difficult to state satisfactory specific distinctions. The feet are covered with fur, even on the soles, and the tail is perhaps more



Sable (*Martes zibellina*).

bushy than in the British martens. The length, exclusive of the tail, is about 18 inches. The fur is brown, grayish-yellow on the throat, and small grayish-yellow spots are scattered on the sides of the neck. The whole fur is extremely lustrous, and hence of the very highest value, an ordinary S. skin being worth six or seven pounds, and one of the finest quality fifteen pounds. The fur attains its highest perfection in the beginning of winter, and the pursuit of the S. at that season is one of the most difficult and adventurous of enterprises. The S. is a native of Siberia, widely distributed over that country, and found in its coldest regions, at least wherever forests extend. The progress of geographical discovery in the eastern parts of Siberia has been much indebted to the expeditions of the hardy and daring S.-hunters, exploring new regions at the worst seasons of the year, and

spending dreary months at a great distance from all human abodes. The S. is taken by traps, which are a kind of pitfall, it being necessary to avoid injury to the fur, or by tracking it through the snow to its hole, and placing a net over the mouth of the hole. It is a very wary animal, and not easily captured. It makes its nest in a hollow tree, or sometimes, it is said, by burrowing in the ground, and lines it with moss, leaves, and grass. From this, it issues to prey on hares and smaller animals of almost any kind, its agility enabling it even to catch birds among the branches of trees. It is ready, when food is scarce, to eat the remains of an animal on which a larger beast of prey has feasted, and is said even to satisfy its hunger with berries in winter, when animal food is not to be had.

SABLE, one of the tinctures in Heraldry, implying black. In heraldic engravings, it is represented by perpendicular and horizontal lines crossing each other.

SABLE ISLAND. See NOVA SCOTIA.

SABLES D'OLONNE, LES, a seaport of France, in the dep. of Vendée. It owes its early importance to Louis XI., who excavated the port, and raised the fortifications. In 1688, its merchant marine was more important than that of either Nantes or Rochelle. The commerce is in grain, wines, cattle, fish (sardines), salt, &c. Pop. (1862), 6382, who are almost all engaged in a seafaring line of life.

SABOTS, a species of wooden shoes much used by the French and Belgian peasantry, especially by those who inhabit moist and marshy districts, as an effectual protective of the feet from external moisture. The fabrication of sabots forms an important branch of French industry, and is chiefly carried on in the deps. of Aisne, Aube, Maine-et-Loire, and Vosges. After being made, they are subjected to the smoke of burning wood, till they acquire that reddish colour so much prized in certain countries.

SABRE, a heavy sword, with which dragoons are armed. The back is thick, that a blow may carry the more force, and also to render the weapon useful in the rough thrust of a cavalry charge. A sabre is occasionally curved at the point, in the form of a scimitar.

SABRE-TA'CHE (Ger. *Säbeltasche*, sword-pocket), a useless square accoutrement which dangles against the legs of officers in some cavalry regiments. It purports to be a pocket for the conveyance of dispatches, &c., but probably is never used. The sabre-tache is hung by smaller ornamental belts from the sword-belt, and is itself covered with gold brocade, the emblems of the regiment, and other devices.

SABRI'NA LAND, discovered in the Antarctic Ocean, March 20, 1839, by Balleny, in lat. 69° 58′ S., long. 121° 8′ E. See ANTARCTIC OCEAN.

SA'CCHARIC ACID ($2HO,C_{12}H_8O_{14}$) is a product of the action of nitric acid, under certain conditions, on grape and cane sugar, or on starch, gum, and lignine. It occurs as a colourless, inodorous, deliquescent, gummy, uncrystallisable mass, which is freely soluble in alcohol. It is sufficiently powerful to dissolve iron and zinc, with extrication of hydrogen. It has a tendency to form double salts, so that it is probably a bibasic acid.

SACCHARO'METER, an instrument for determining the quantity of sugar in liquids, especially brewers' and distillers' worts. In principle, it resembles the hydrometer, used for ascertaining the strength of alcoholic liquids. It consists of a hollow sphere or oval of thin brass, with a graduated stem and a hook so placed opposite each other, that when placed in water, it floats, and the graduated stem stands upright on the top, and the hook is below, for the purpose of appending weights. The degree to which the stem sinks gives the means of calculating, by tables prepared on purpose, the proportion of saccharine matter present in the liquid.

SA'CCHARUM. See SUGAR-CANE.

SACCOTOO. See SOKOTO.

SACHEVEREL, HENRY, D.D., was born in the year 1672, at Marlborough, where his father was minister of St Peter's Church and noted for his attachment to the High Church principles, which were afterwards embraced by his son. The youth was educated at the grammar-school of his native place, and at Magdalen College, Oxford, where he occupied chambers along with the celebrated Addison, who then and for many years afterwards seems to have entertained for him a warm regard. He obtained a fellowship in his college, and took successively the degrees of M.A. (1696), of B.D. (1707), and of D.D. (1708). In 1705, he became preacher of St Saviour's, Southwark; and in 1709, he delivered the two sermons—one at the assizes at Derby, the other on the 5th November at St Paul's—which have given him a place in the history of his country. The rancour with which he attacked in these sermons the principles of the Revolution Settlement, asserted the doctrine of non-resistance, and decried the Act of Toleration, excited the indignation of the Whig government of the hour, and led to his impeachment for high crimes and misdemeanours. His trial before the House of Lords took place in the spring of 1710, and resulted in his being found guilty, and suspended from preaching for three years, the obnoxious discourses being ordered to be publicly burned by the hangman. Of the rage of factions on the occasion, the fury of the popular excitement, and the excesses of the High Church party, an account in detail will be found in any history of the period. S. became for the time the most popular man in the kingdom, and the general election which followed was fatal to the government which had prosecuted him. When, in 1713, his suspension as by sentence expired, as a special mark of honour he was appointed by the new House of Commons to preach before them the sermon on the anniversary of the Restoration, and specially thanked on the occasion. A more substantial token of favour was his presentation to the rectory of St Andrew's, Holborn. Subsequently—except that there is some reason to believe he was more or less concerned in a plot to restore the Stuarts—he disappears from the sphere of history. He is said, in his later years, to have sought the excitement which may in some sort have become necessary to him, in a series of paltry and undignified squabbles with his parishioners. Nor in this is there anything improbable. His character was essentially a weak, vain, and shallow one, and he remains notable merely as one of those men, intrinsically insignificant, who have had a spurious notoriety and importance thrust upon them by the accident of foolish activity in a special concurrence of circumstances.

SACHS, HANS, the most prolific and at the same time the most important German poet of his time, was born on the 5th of November 1494, at Nurnberg, where his father was a tailor. While at school, he learned the rudiments of Latin, but at no time of his life could he be called a scholar in the strict sense of the term, although he was certainly a well and widely-informed man. About the age of

15, he was sent to learn the craft of shoemaking; his love of verse, however, also led him to become a disciple of Leonhard Nunnenbeck, weaver and *meistersinger* in his native town. On finishing his apprenticeship, S., as was the custom of craftsmen in those days, made a sort of tour or pilgrimage through Germany, frequenting assiduously the verse-making schools or corporations organised by the trade-guilds in the different cities, the members of which, known as *meistersingers*, had, since the disappearance of the older *minnesingers*, or minstrels of chivalry, become the chief representatives of German poetry. On his return to Nürnberg, he commenced business as a shoemaker, prospered in his calling; and after a long, cheerful, and happy life, died on the 25th of January 1576, at the age of 82. S. was twice married—first to Kunegunda Kreutzer, who bore him five sons and two daughters; and afterwards, in his 66th year, to Barbara Harscher. His grave is still to be seen in St John's churchyard, Nurnberg. S.'s career as an author is divided into two periods. In the first, he shews an interest mainly in the occurrences that were then agitating Germany. It was the epoch of the Reformation of Luther, whose praises he celebrated (1523) in an allegorical tale entitled *Die Wittenbergisch Nachtigal*, while his poetical fly-sheets (of which about 200 are known) furthered in no small measure the Protestant cause. In the second period, his poetical activity was turned more to the delineation of common life and manners. His poetry is distinguished by its heartiness, good sense, homely genuine morality, and freshness; its clear and healthy humour, and its skilful manipulation of material. It is, on the other hand, deficient in high imagination and brilliant fancy, and contains large tracts of dry, prosaic, insipid verse. S.'s best productions are his *Schwänke*, or Merry Tales, the humour of which is sometimes unsurpassable; but his serious tales, allegorical and spiritual songs, and his dramas, also shew a great advance on his predecessors. His special *meistergesänge*, on the other hand, are of little or no value. Manuscript copies of S.'s poems —some in his own handwriting— are to be seen in the libraries at Zwickau, Dresden, Leipzig, and elsewhere. When S. had reached the 52d year of his career as a poet, he took stock of his work, and found that he had written 34 vols., containing upwards of 6200 pieces, among which were 4275 meistergesänge, 208 comedies and tragedies, about 1700 merry tales, secular and religious dialogues, proverbs, and fables, 7 prose dialogues, and 73 songs, secular and devotional. The first edition of his works was published at Augsburg in 1558, but the best is that of Willer (5 folio vols. 1570—1579); a later quarto edition, known as the *Kemptener*, appeared in 1612—1617, and was republished at Augsburg in 1712. After the middle of the 17th c., when a deep stupor seized the German mind, and it could produce nothing but tomes of idle theology, varied by an occasional hymn of more or less merit, S., with all his poetic brethren, suffered a total neglect, from which he did not recover till Goethe wrote his pleasant poem, *Hans Sachs, Erklärung eines alten Holzschnitts vorstellend Hans Sachs's poetische Sendung* (1776), since which time partial collections of S.'s works have frequently appeared.

SACK, a large bag made of a coarse hempen cloth called sacking or sackcloth. Such bags are used for the conveyance of corn, flour, and other bulky articles. A corn-sack is usually made to contain four bushels, hence it is constantly spoken of as a measure of quantity, two sacks being equal to one quarter of corn.

SACK. A name in common use in the time of Shakspeare, and occurring down to the middle of the 18th c. as denoting a kind of wine. The exact nature of this famous wine, the favourite beverage of Falstaff, and the origin of the name, have been much discussed. Sack or seck seems to be simply an English disguise of the Spanish *seco* (Fr. *sec*), applied to wines of the sherry genus, as distinguished from the sweet wines; a term which we now translate by 'dry.'

SA'CKBUT (Fr. *saquebute*), the name under which the Trombone (q. v.) was known on its first introduction to England.

SA'CKETTS HARBOUR (in America, it is spelled Harbor), a village and port in New York, U. S., on the south shore of Black River Bay, 8 miles east of Lake Ontario, 170 miles west-north-west of Albany, having a navy-yard, barracks, mills, &c. In the war of 1812, it was an important port, where the frigate *Superior*, of 66 guns, was built in 80 days, and the *Madison* in 45 days, from timber standing in the forest. A man-of-war of 3200 tons, begun before the treaty of disarmament, is still upon the stocks. The town has declined since the war, and has now a population of but 2000 or 3000.

SACKVILLE, THOMAS, Earl of Dorset, an English poet and statesman, was born at Buckhurst, Sussex, in 1536. He was the only son of Sir Richard Sackville; studied at Oxford and Cambridge, where he acquired a high reputation as a poet both in Latin and English, and afterwards became a student of the Inner Temple. While a member of this society, he wrote, along with Thomas Norton, a blank-verse tragedy, called *Ferrex and Porrex* (afterwards called *Gorboduc*), which was performed before Queen Elizabeth at Whitehall in 1561—1562. This work, the plot of which is founded on a British legend, claims particular notice as the earliest tragedy in the English language. It is moulded to some extent on the classic drama, the incidents being moralised at intervals by a chorus. It has no dramatic life or energy, but the style is pure and stately, evincing eloquence and power of thought. S.'s other productions (first published in 1563) are the *Induction*, a poetical preface to the *Mirrour for Magistrates*, and the *Complaint of the Duke of Buckingham*, which was designed to conclude the work. The *Induction* is a noble poem, uniting, as Hallam says, 'the school of Chaucer and Lydgate to the *Fairy Queen*,' and almost rivalling the latter in the magnificence and dignity of its allegoric personifications. The influence of Dante is very perceptible. S. now abandoned literature, and after travelling in France and Italy, returned to England, and entered public life. Soon after his father's death in 1566, he was created Lord Buckhurst, became a favourite with the queen, who employed him in foreign diplomacy, and on the death of Burleigh, succeeded him in his office of Lord High Treasurer (equivalent to Prime Minister in those days), in which capacity he shewed himself not inferior in sagacity and fidelity to his great predecessor. On the accession of King James, his patent of office was renewed for life; and in the following year, he was created Earl of Dorset. S. died April 19, 1608, and was buried with ceremony in Westminster Abbey. His works are edited by the Rev. Sackville West, in Smith's *Library of Old Authors* (Lond. 1859).

SA'CO, a river of New England, U.S., rises in the White Mountains of New Hampshire, runs south-easterly through the south-western portion of Maine, through Saco Bay, to the Atlantic Ocean. Its course of 160 miles is almost a continuous

succession of falls, the last being but 4 miles from its mouth, affording water-power to numerous factories.

SACO, a town in Maine, U.S., is built on the east bank of the Saco River, at its last falls, 4 miles from its mouth, 14 miles south-west of Portland. It has numerous manufactories, including 5 cotton-mills, which produce 7,000,000 yards annually, 4 saw-mills, and several ship-yards. Pop. (1860) 6223.

SA'CRAMENT (Lat. *sacramentum*, *mysterium*, Gr. *mysterion*), the name given by theological writers to certain religious rites, the number as well as effects of which are the subject of much controversy between various bodies of Christians. The word *sacramentum*, in primitive classical usage, meant either the oath taken by soldiers on their first enrolment, or the sum of money deposited by suitors on entering upon a cause, and forfeited 'to sacred uses' by the unsuccessful party; and the corresponding classical Greek word *mysterion* meant not merely the secret religious ceremonies practised in the worship of certain gods, but also any revealed secret. It is certain, nevertheless, that at a very early period of the Christian Church, both the Latin word and its Greek equivalent came to be applied specially to certain rites of the Christian ceremonial, and chiefly (or as is commonly held by Protestants, exclusively) to those of baptism and the Eucharist. Of the catechetical lectures of St Cyril of Jerusalem, the lectures devoted to the subject of baptism and the Eucharist are called 'mystagogic lectures.' For our purposes, it will be enough to state concisely what are the views of the several religious communities on this much controverted subject, which formed one of the earliest grounds of division between the Roman Church and the Reformers of the 16th century.

In the Roman Church, it is held that there are seven sacraments, viz.: Baptism, Confirmation, the Eucharist, Penance, Extreme Unction, Holy Orders, and Matrimony. The special teaching of Catholics on each of these rites will be found under the several heads; but there are certain general principles regarding them all, on which the Roman Catholic doctrine differs widely from that of the Reformed communities. Catholics define a sacrament to be a visible or sensible sign permanently instituted by God, and conveying real interior grace to the recipient, and they teach that all sacraments contain within themselves, as instruments, and, when they are received with proper dispositions, produce such grace by the virtue imparted to them by God, and not merely through the faith of the recipient; although they hold that proper dispositions on the part of the recipient, as sorrow for sin, love of God, pious resolves, &c., are conditions indispensable for the efficacy of the sacramental rite. See OPUS OPERATUM. They divide the sacraments into two classes, 'sacraments of the living,' and 'sacraments of the dead.' The first class comprises the Eucharist, Confirmation, Holy Orders, and Matrimony—all which sacraments can only be received fruitfully by persons in a state of grace or justification. The second includes Baptism, Penance, and Extreme Unction, the special purpose of which is to remit sin, and which therefore can be received by persons in a state of sin, but penitent for that sin, and resolved to amend their lives. Of three of the sacraments, viz., Baptism, Confirmation, and Holy Orders, it is held that they imprint a 'character,' and therefore that they can only be received once. The others may be repeatedly received, but under conditions which will be learned under each separate head. Two things are held to enter into the constitution of the sacrament—viz., the 'matter' and the 'form.' By the former is meant the material element or the physical action whereby that element is applied to the recipient of the sacrament; as water in baptism, oil in extreme unction, and in both the act of washing or of anointing. By the latter is understood the form of words employed by the minister in communicating to the recipient the external rite in which the sacramental act consists. The minister of a sacrament is the person who is supposed to be divinely authorised to impart it. The minister is different for different sacraments, as will be found under each separate head.

The Reformed Churches have for the most part discarded these views. By the majority of them, the sacraments are held to be merely ceremonial observances, partly designed as a solemn act, by which each individual is admitted to membership, or desires to make solemn profession thereof; partly intended to stimulate the faith and excite the fervour and the pious dispositions of the recipient, to which dispositions alone all the interior effects are to be ascribed. As to the number of rites called by the name, almost all Protestants agree in restricting it to two—viz., Baptism and the Lord's Supper; although some of the rites which Catholics regard as sacramental are retained by some of the Protestant communities as religious observances. In the English Church, however, there has always been a school in which opinion tending towards the Catholic view has prevailed. Not only has this school ascribed to the two rites of Baptism and the Eucharist or Lord's Supper (q. v.) the power of producing an interior grace (which in the former is called regeneration); but many of them have been willing to call the other rites, especially confirmation, penance, and holy orders, by the name of sacrament, although of a secondary character, and not 'generally necessary to salvation.' See TRACTARIANISM. The controversy on these questions has been recently the subject of more than one proceeding in the ecclesiastical courts and in the Privy Council.

SACRAMENTA'RIAN, the name given in the 16th c. to the party among the Reformers who separated from Luther on the doctrine of the Eucharist. Luther (q. v.) taught the doctrine of the real presence of the body and blood of Christ along with the bread and wine (see LORD'S SUPPER; REAL PRESENCE). The first of his followers who called this doctrine in question was Andrew Carlstadt; and notwithstanding the protest of his leader, Carlstadt had many followers, the most active of whom were Capito and Bucer. The party became so considerable, that in the diet of Augsburg they claimed to present a special confession distinct from that put forward by the general body. The sacramentarian confession is known in history by the name of the Tetrapolitan Confession—so called from the four cities, Strasburg, Constance, Lindau, and Memmingen. The Tetrapolitan Confession rejects the doctrine of a corporeal presence, and although it admits a spiritual presence of Christ which the devout soul can feel and enjoy, it excludes all idea of a physical presence of Christ's body. Simultaneously with this German movement, yet independent of it, was that of the Swiss reformer Zwingli, whose doctrine on the Eucharist was identical with that of Carlstadt, and who himself presented a private confession of faith to the Augsburg diet, in which this doctrine is embodied. The four cities named above continued for many years to adhere to this confession presented to the diet of Augsburg in their name; but eventually they accepted the so-called Confession of Augsburg, and were merged in the general body of Lutherans.

On the contrary, the article of Zwingli upon the Eucharist was in substance embodied in the confession of the Helvetic Church.

SACRAME'NTO, a city and port of entry and capital of California, is built on the east bank of the Sacramento River, 125 miles from the sea, lat. 38° 33' N., long. 121° 20' W. The streets cross each other at right angles on a level plain, only 30 feet above the sea. The stores and shops are built of brick, the dwellings of wood, with shade-trees and gardens. The principal public buildings are the state capitol, custom-house, and post-office. 25 steamboats are owned here. The chief trade is furnishing supplies to the mining districts. S. was settled in 1839 by Captain Sutter, a Swiss, who built a fort. In 1848, the first town-lots were sold, and the first house built in 1849. In 1853, the town was inundated to the depth of 5 feet in the streets, which have been raised and protected by embankments. In 1854, it became the state capital, and in 1860 had a population of 13,788.

SACRAMENTO, a large river in California, U.S., which, with the San Joaquim, drains the Great Central Valley. It rises in the north-eastern part of the state, in the Sierra Nevada, by North and South Forks, where, during its south-westerly course of 200 miles, it is called Pitt River and Upper Sacramento; thence it flows nearly due south, receiving numerous branches from the Sierra Nevada on the east, and the coast-range of mountains on the west, until it unites with the river San Joaquim, and flows westerly through San Pablo and San Francisco bays to the Pacific Ocean. It is navigable to Sacramento, 50 miles from San Pablo Bay, and for small vessels 150 miles further, its entire length being about 500 miles.

SACRA'RIUM, a sacred apartment in Roman houses.

SACRED HEART OF JESUS, Feast of, a festival of comparatively modern institution in the Roman Catholic Church, and for a time the subject of much controversy among Roman Catholics themselves. Its origin is traced to a vision which is recorded of a French nun, of the order of the Visitation, named Mary Margaret Alacoque, who lived at Paray la Moniale, in Burgundy, in the latter half of the 17th c., and whose enthusiasm led her to practise a special devotion to the heart of the Saviour. This devotion was gradually propagated in France, and at length was approved by Pope Clement XII. in 1732 and 1736, and by Clement XIII. in 1765. The festival is held on the Friday after the octave of Corpus Christi. Confraternities of the Sacred Heart are disseminated through all parts of the church.

SACRED MUSIC. Music has, from very early times, been connected with religious rites. It entered into the worship of the Jews, and both sacred and profane history tell us that, in the primitive Christian Church, the service consisted partly of music. Little is known regarding the kind of music used by the early Christian converts; it has been supposed to have been partly Greek, with an intermixture of Hebrew melody. As early as the time of Ignatius, who was a disciple of St John, the Psalms of David were sung *antiphonally*, as practised to the present day—i. e., by two choirs responding to each other, which had doubtless been formerly the practice among the Jews. At first, the whole congregation, clergy and laity, joined in the psalm; but difficulties and abuses having arisen from the growing neglect of musical culture, the Council of Laodicea, in 363, found it necessary, for the securing of decency and order in worship, to prohibit the laity from singing in church except in certain chants of a very simple and popular character. From that period down to the Reformation, the music of the church was almost entirely surrendered to the clergy and trained musicians. See Psalmody.

The first name of importance in the history of the music of the Western Church is St Ambrose, (q. v.), whose musical service (see Ambrosian Chant) was reformed by Pope Gregory (see Gregorian Chant). The use of the organ in churches dates from about the 9th c., and some centuries later, Counterpoint (q. v.) was introduced to a limited extent into the music of the church. Among the corruptions which followed it, some are of a nature the very mention of which startles us. Not merely were popular melodies of a secular nature often taken and worked up into church music, but the secular words were actually transplanted into the religious compositions, being habitually given out by the tenor voice, while the actual solemn words of the church service were being sung by soprano, alto, and bass. Papal bulls having sought in vain to combat this abuse, it was brought under the cognizance first of the Council of Basel, and then of that of Trent. The Council of Trent prohibited the performance of any mass or motett of which profane words formed a part, and also of music founded on secular themes. Some compositions of Palestrina were singled out for praise, and their author was intrusted with the task of remodelling this part of religious worship. He composed three masses on the reformed principle, one of which, known as the *Missa papæ Marcelli* (so called as being a tribute of gratitude to the memory of that pontiff), may be looked on as having saved music to the church, by establishing a type far higher than anything that had preceded it, and still revered by all lovers of music. The *mass* (including the *offertory* and *gradual*) has always continued to be an important part of the sacred vocal music of the Roman Catholic Church, and affords large scope for the display of the higher qualities of musical composition.

Various new types of music sprang up in the different Protestant churches after the Reformation. The solemn and measured *chorale* (q. v.), or melody to which psalms or hymns are sung in unison, though generally associated with the Lutheran Church of Germany, was in reality handed down from a very early period. Psalmody in its modern sense may be considered to have originated in the 16th c., when Clement Marot, the court poet of Francis I., translated fifty-two of the Psalms into French verse. Psalm-singing was at first a fashionable amusement of the gay courtiers of Francis; but being taken up by the Reformers, was soon discountenanced by the Roman Catholics, and looked on as a badge of Protestantism. See Psalmody.

In the full choral service of the Church of England, as performed in cathedrals and collegiate churches, the greater part of the prayers and the litany are *intoned* or read in monotone (see Intoning), the monotone being occasionally varied by harmony at the close. The Psalms and *Gloria Patri* are chanted with the accompaniment of the organ, as also are the various canticles; the latter, however, particularly the *Te Deum*, being often sung to rhythmical music of a more elaborate kind, called *services*. The form of the Anglican chant now used for the Psalms seems to have been invented by Tallis. In the single chant, each verse is sung to the same music; in the double chant, the whole occupies two verses. The antiphonal chanting, with the Anglican double chant, has sometimes been objected to as repugnant to the proper expression of the words, as coupling verses between which there

is a full stop in the sense, and as placing a full stop when the sense runs on; and among the High Church party there has been a disposition to recur to the Gregorian chants, whose indefinite musical expression, absence of rhythm, and uncertain accent, give them a power of bending to the requirements of the words. The Gregorian chant has, however, not succeeded in making its way into the service of any of the English cathedrals. The *anthem* forms a part of the complete musical service. It is somewhat similar in character to the motett of the Roman Catholic and Lutheran churches; a sacred cantata, in which the words are taken from the Psalms or other portions of Scripture; and the music is for solo, parts, or chorus, or a mixture of the three.

In the Presbyterian churches of Scotland, psalmody has formed almost the entire music; while hymns—sometimes not of a very solemn or devotional character—predominate among the English dissenters. Some years ago, church music in Scotland had fallen to the lowest state of degradation; but efforts have lately been made, with some success, to raise its character. Even organs, which were proscribed by the early Scottish reformers, and have ever since been in disfavour, have begun to be introduced; and chanting has been admitted into some few Presbyterian churches.

Of sacred musical compositions not intended to form part of the service of the church, the most important is the *Oratorio* (q. v.), a composition either entirely dramatic, or combining the drama and epic, where the text is illustrative of some religious subject, and the music consists of recitatives, airs, part-songs, and choruses, accompanied by orchestra and organ.

SA'CRIFICE, one of the most important elements of divine worship, common to all nations of antiquity, and therefore traced by some to a primeval revelation. The powers of nature, palpable in their effects for good and evil, could not but inspire man, even in his rudest stage, with gratitude or fear towards the unseen being or beings by whom he conceived them to be actuated. The next and most natural step was the outward manifestation of these feelings by a token which bespoke either thankfulness or the wish of conciliation on the part of the donor. The supreme numina being conceived merely as superior men with exaggerated human wants, the means taken to gratify them were adapted to this conception. The best and first fruits of the soil, the finest and most immaculate animals of the flock, were offered to the gods, that they might either partake of them bodily, or at least enjoy the sweet smell arising from the altar on which they were burned in their honour; and the deity was supposed emphatically to express its readiness to accept the offering by sending down the fire that was to consume the animal prepared. The more the divine favour was sought for some special purpose, the costlier and more precious became the gift; and nothing short of the most startling proofs of self-abnegation seemed, at times, to satisfy the devotion of man in his uncultivated state. From the simple and child-like notion of establishing a certain kindly and permanent relation between the invisible powers and man, by the yielding up on the part of the latter a certain more or less precious portion of what the former had given him, there grew up such horrible monstrosities, that, in honour of humanity, we should feel inclined to doubt them, were they not so well attested, and did they not, to a certain extent, still prevail in our own days. Method and system took in hand that undeveloped child-like instinct which touchingly offered the deity a flower, a blooming bough, a golden fruit; and degraded it into mysticism and superstition; ending at last in the theory that the divine revenge was to be gratified, the divine vanity flattered, and the deity made as generally pleased as could be by holocausts of human beings, friends or foes—nay, the dearer the being to the offerer, the more the self-abnegation must become patent, and the more the god must smile upon the donor. The Moloch worship—the mother placing her babe in the arms of the monstrous idol, and seeing it slowly burned before her own eyes—seems well nigh to exhaust all the horrors of human ingenuity.

Turning first of all to those most ancient and hallowed records of humanity contained in the Old Testament, we find the custom of sacrifice almost on its first pages, and spoken of as a rite already established. Sacrifice is the cause of the first murder on record. Abraham is prevented by a voice from heaven from carrying out the slaughter of Isaac, into which he had been 'tempted' by Jehovah; all the patriarchs, in fact, sacrifice, either independently or in ratification of a covenant; and the exodus itself was brought to pass under the pretence of the people having to offer up their wonted sacrifice in the desert.

According to the highest ancient authorities, both Jewish and Christian—of whom we will only mention Maimonides and Ephraem Syrus—the Mosaic sacrifices were neither more nor less than a kind of divine concession to the sensual nature of an uncultivated people, full of Egyptian reminiscences on the one hand, and surrounded by Canaanitish modes of worship on the other. It was, as Ephraem Syrus says, only at a very late period that Moses, by the command of God, in whose eyes the rites of priests and sacrifices have but little value, prescribed these observances to his people, on account of their weakness and hardness of heart—lest they might despise a 'naked' religion, and attach themselves to false gods, whose magnificent and dazzling cultus surrounded them on all sides. In corroboration of this view, the prophets are appealed to, who never cease to inveigh against sacrifice as such, when, according to their view, the people were educated enough to do without this symbol and to worship God in truth and in spirit. (Compare Jeremiah vii. 22; I Samuel xv. 22; Psalms l. 8–10; li. 18, 19; Isaiah i. 11, &c.) But the institution being deemed necessary for the time, legislation had to circumscribe it rigorously, so as to make it as little hurtful as possible. Ceremonies contrary to morals and decency, such as were practised in the temples of Canaan, the abominations of phallic rites, the sacrifices of virginity, and, finally, the offering up of human beings, were punished with instant death by the Mosaic law.

How the principal modes of sacrificial offerings, such as they had naturally developed, nearly alike everywhere throughout antiquity, and as they had obtained in the pre-Mosaic times among the Hebrews, were adopted in the Mosaic legislation, and adapted to its exalted religious character, we can only indicate here in the briefest outlines. These pre-Mosaic sacrifices were chiefly of three kinds: first, the 'propitiatory,' i. e., an offering enjoyed by the deity in any form that would be grateful to him, conciliate him, procure his aid and blessing in times of need or for some special undertaking, and would further obtain his forgiveness, if something had been done unwittingly that might have offended him. This kind of sacrifice, whether bloody or unbloody (e. g., harvest sacrifice), appears to have been fully burned (*Olah*). The second kind partook more of the nature of sacrificial meals, in which both the divinity, the priest, the man who offered the sacrifice, together with his

friends, took a part. It was a solemn and joyous oblation, expressing the thanks of the individual for some obtained favour, in which he wished others to join. Only the parts supposed to be the choicest were burned upon the altar; the priests received some other parts, and the rest formed the grateful sacrificial repast (*Sebach Shelamim*). The last was the expiatory sacrifice, intended as an equivalent for some deadly crime, which either was not punishable by the existing laws, or which had been committed under circumstances that would not have warranted capital punishment. From the notion, that the blood of the murderer was necessary for 'the cleansing of the blood that is shed' (cf. Numb. xxxv. 33), sprang that other, it would appear, that there was expiatory power in the blood itself; and that further, the blood of an animal was a fitting representative of, and equivalent for that of the human criminal, who had only to transfer, as it were, his sin to the animal by placing his hand upon its head, and perhaps [illegible] a formula to that effect. The flesh of this animal was not deemed fit for the altar, and was probably burned at some other place (*Chattath, Asham*). The Mosaic legislation finding such general elements ready, proceeded eclectically. They were partly embodied with considerable alterations, and partly rejected unconditionally. The anthropopathic idea of the 'agreeable smell,' as well as the notion of the expiatory power of the blood, were retained—the latter, however, with this modification, that the poor were allowed to use flour instead of meat for their sin-offerings. But the principal alterations introduced were the abolition of all polytheistic rites from the sacrificial service, of all the immoral, obscene, and horrible ceremonies connected with the heathen practice, and finally, the totally different definition and limits given to the 'sin-offering.' While formerly, everything could be expiated by a sacrifice, henceforth, only unpremeditated sin could by this means be effaced; while there was no expiation for any premeditated crime; the law simply took its course in that case.* Further, many things till then permitted were prohibited, and thus fell under the denomination of 'sin;' and certain purifications—beneficial in themselves—were connected with the expiatory sacrifice, and their practice thus strongly enforced. This extension of the notion of 'sin-offering' rendered a subdivision of it necessary; the more venial, or rather unconscious transgressions, were treated differently from the less pardonable ones in the ritual.

While Mosaism thus seemed, in its adoption of the rite of sacrifice, to make one of the most important concessions to heathenism, this very rite was, on the other hand, calculated to attract the early Hebrews to the worship of Jehovah, and at the same time to wean them from the horrible practices connected with it among the Canaanites. But more; during the primary stages of the people's existence, it served, by inculcating observances which were at once hygienic and symbolic of purity and holiness, as a powerful means of education and culture. In order, however, that these beneficial consequences premeditated by the lawgiver should not be frustrated, it was necessary, above all things, to keep the strictest possible supervision over it; and this was best established by the legal transfer of the whole sacrificial service to one single spot of the land, finally, the temple at Jerusalem. The 'heights' and their 'heathen abominations' were thus theoretically abolished, and the sacrifice that only at one central point could in reality be said to be offered up for the 'whole community of Israel,' went far, under these circumstances, to awaken and to strengthen a common spirit of nationality and patriotism, which was further aided by the periodical pilgrimages. For the details of the Jewish sacrifices, we must refer to the Old Testament generally.

As to the different opinions held by Jewish and Christian authorities regarding sacrifice, when offered up in expiation of a sin either by the people or by individuals, suffice it here to mention that they are divided between the various notions of the offering being either a present to the offended deity, a civil punishment (*mulcta*), or, finally, a kind of substitute for the sinners themselves. The latter is the view held by many of the rabbinical writers as well as church Fathers. The life (Nephesh) of the animal or its blood (Lev. xvii. 11) was distinctly said to make 'the atonement for the soul.' This notion of a representative victim is one that belonged to the whole ancient world, and often finds its expression in the Old Testament. The sacrifice of the covenant (Jer. xxxiv. 18, &c.), the scapegoat (Lev. xvi. 21), and the like, are so many embodiments of this idea; which by Christian divines is held to have found its acme and final fulfilment in the sacrifice of God himself, as the 'Man Christ,' who united in himself the priest, the offerer, and the sacrifice. In fact, the whole institution of sacrifices is throughout the New Testament and the Fathers held to have been merely typical of this final act, by which the sin of man was expiated. See ATONEMENT, MASS.

The Jewish sacrifices, rejected already by the Essenes, ceased with the downfall of the Temple in Jerusalem; although the Samaritans, who claim to retain exclusively the Mosaic covenant, still continue this rite on Mount Gerizim on the Passover. The orthodox Jews, however, include in the prayers for the restoration of the visible sanctuary on Zion, also that of the restoration of the sacrifices 'in their order and proper rule,' 'of the priests to their service, and the Levites to their songs and hymns,' and each day, Sabbath, or Feast, the sacrifice incumbent upon it is mentioned in the prayers; and on fast-days, especially on the day of atonement, the diminution of bodily substance supposed to arise from the abstinence, the 'fat and blood' may, it is supplicated, be considered by God as tantamount for that of the sacrificial animals which, through their sins, the people are not now deemed worthy of offering up. The modern (extreme) party of reformed Jews, however, repudiate, together with the literal interpretation of the Messianic prophecies, also that notion of the sacrifices ever being restored again.

We can only very briefly touch upon the sacrificial customs among other nations of antiquity. The same feeling of dependence upon supreme, invisible, but ever-present powers, engendered, as we said at the beginning, everywhere nearly the same expressions of awe, gratitude, and the like. The gifts proffered differed, according to the degree of culture, the mode of life, and the products of the soil among the different peoples. No less was the significance attached to the gift different in proportion to the mental development of those who offered; at one time considered as a present, to be taken and sensually enjoyed, as it were, by the Deity, it at others assumed a higher and purely symbolical aspect, as an expression of gratitude, love, repentance. In the same proportion, the gifts themselves varied, not only respecting their nature, but also

* One of the most characteristic exceptions, however, was that in favour of those who had denied the possession of some pledged article, or who had wilfully cheated or robbed their neighbours. If they were eager to make voluntary and ample restitution, 'the door of repentance was opened to them,' and they were allowed to make public expiation through sacrifice.

respecting their value. While Mongols and Tartars, Lapps and Negroes, most of the ancient nomad tribes in fact, generally sacrificed the milk and the uneatable parts of the animal only, its bones, horns, skin, &c.; the Greeks and Romans offered not unfrequently thousands of the choicest, most immaculate animals, and the sacrificial vessels were with them, as with the Hebrews, wrought of the most precious metals. Votive offerings—arms, spoil, garments, tools, locks, poems, &c.—customary in the better days of Rome and Greece; and the sacrifice of chastity on the part of maidens and women—chiefly the custom of Babylon, Phœnicia, Cyprus, &c., likewise fall under the denomination of sacrifice in its wider sense. Among the Indians, Bactrians, Medes, and Persians, the sacrifices consisted of fruits, libations, animals, and the like, and were of many degrees and numbers. Among the first-named, the study of the Vedas was reckoned as the first round in the sacrificial ladder. With the Persians (see GUEBRES, PARSEES), the priests at the Daruns sacrifice, instituted in honour of Zerdusht the lawgiver, eat small unleavened cakes, and drink Hom-juice, which is to represent the blood of the prophet. They also have sacrifices for the souls of the deceased. The Buddhists offer flowers and first-fruits only; their animal sacrifices are represented by small animal figures kneaded of dough, offered up on certain occasions. Of the 'classical' peoples and their sacrificial debauches, which followed the primeval frugality in their offerings no less than in their lives, we need not speak here, save as far as they, too, indulged in the rite of human sacrifice from their very earliest period to their decadence. Among the Greeks, the legendary tales of the daughters of Erechtheus, and of Iphigeneia in mythical times, the sanctuary of Zeus Laphystius at Halos and at Lycæa, in Arcadia, the offering up of three Persians by Themistocles before the battle of Salamis, are tokens sufficiently indicative of the generality of the practice. Among the Romans, human sacrifices, in use during the Republic—either enthusiastic voluntary deeds of patriotism, or simply a kind of execution in punishment of a deadly sin—were prohibited in later times by the senate; but both Augustus and Sextus Pompeius committed wholesale murders by way of political sacrifice to the gods. That this abomination of slaughtering men in honour of God at stated periods, flourished to an awful extent among our northern ancestors—Scandinavians and Germans, as well as among Gauls and other Celts—need hardly be added. At Upsala, every ninth year, a great sacrifice of expiation was offered up, consisting of nine human beings and sixty-three animals. The Danes, in the same manner, held a sacred sacrifice every ninth year, of ninety-nine men, besides horses, dogs, cocks, and other domestic animals (see the EDDAS; Muller, *Sagenbibliothek*; Pertz, *Mon. Germ. Hist.*: *Script. passim*, &c.). The German tribes, even after their conversion to Christianity, continued to offer up their prisoners of war, as of yore, just as the Franks brought their sacrifices both to their ancient gods and to Christ. Any illness, danger, sickness—the slightest inducement, in fact, sufficed to move the Gauls towards a human holocaust, in the fashion of the worshippers of Baal and Moloch. At the death of a man, all his possessions, movable and immovable, including slaves, clients, wives, and all, were offered up to his manes. See SUTTEE. That the ancient Mexicans, the negroes, and other wild tribes, were highly proficient in this sort of wholesale slaughter, need hardly be added: the king of Dahomey's practices, and the fruitless remonstrances of our own government, are a too well-known illustration of the firm hold this kind of murder in honour of the Deity has of the human mind. In conclusion, may we not consider the cruelties and massacres committed upon the Jews in the middle ages, in the name of Christ, as a last offspring of that Moloch or Baal worship which seems to be an instinct in the superstitious mind, whether Pagan or Christian?

SA'CRILEGE is not now a legal, but is a popular term used to denote the breaking into a place of worship, and stealing therefrom. In England, whoever breaks and enters any church, chapel, meeting-house, or other place of divine worship, and commits any felony therein; or whoever, being in such places, shall commit any felony therein, and break out of the same, is guilty of felony, and liable to penal servitude for life, or for not less than three years, or to imprisonment for a term not exceeding two years, with hard labour. The legal offence comes generally under the head of burglary or house-breaking. A less punishment applies to the offence when committed in dissenting chapels.—In Scotland, there is no increase of severity in the punishment, by reason of the sacred character of the things stolen.

SA'CRISTAN (Lat. *sacra*, sacred things), an official attached to a church, who is charged, under the priest or ruler of the church, with the care of the church, and of all its appurtenances. It is his duty to open and close the church, to take care of the sacred vestments and utensils, and to prepare what may be required for public service. In some Roman Catholic churches, the sacristan is a clerk in minor order. The English name sexton is derived from this word.

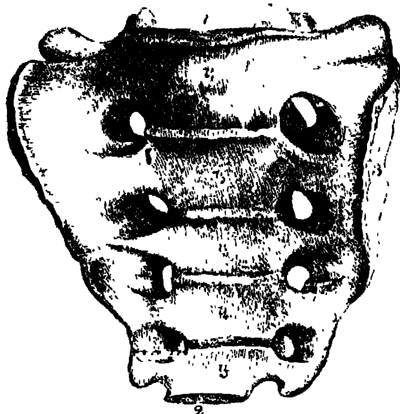
SA'CRISTY, an apartment attached to a church, in which are kept the sacred objects used in the public worship, and in which the clergy and other functionaries who take part in the service assemble and prepare for the ceremonies on which they are about to enter. In many foreign churches, the sacristy is a spacious and costly building.

SACROBOSCO, JOANNES DE (Anglicè, *John of Holywood*), was an English mathematician of the 13th c., entered the university of Paris in 1221, and afterwards became professor there. He died at Paris in 1256. S. was one of the first doctors of the middle ages who made use of the astronomical writings of the Arabians. His treatise, *De Sphæra Mundi*, is merely a paraphrase of a portion of Ptolemy's *Almagest*. No book enjoyed greater renown as a manual among the scholastics. First published in 1472, it passed through more than 20 editions—some even say 65—with as many commentaries. Other works of S. are *De Computo Ecclesiastico* and *De Algorithmo*, one of the first works on arithmetic in which the numerical notation of the Arabs is employed.

SA'CRUM, or OS SACRUM, is a triangular bone situated at the lower part of the vertebral column (of which it is a natural continuation), and wedged between the two innominate bones so as to form the keystone to the pelvic arch. It is readily seen to consist of five vertebræ with their bodies and processes, all consolidated into a single bone. Its anterior surface (as shewn in the figure) is concave, not only from above downwards, but also from side to side. The posterior surface is convex, and presents, in the middle vertical line, a crest, formed by the fusion of the spines of the vertebræ, of which the bone is composed. The last sacral vertebra has, however, no spine, and the termination of the vertebral canal is here very slightly protected.

Various reasons have been assigned for the peculiar name assigned from very olden times to

this bone. One of the reasons assigned is, that it was the part used in sacrifices. Another reason is based on the view maintained by the Jewish rabbins,



Sacrum.

1, Surface articulating with last lumbar vertebra; 2, surface articulating with coccyx; 3, surface articulating with the os innominatum; v_1, v_2, v_3, v_4, v_5, the bodies of the five sacral vertebræ.

who held that this part of the skeleton, which they called 'luz,' resisted decay, and became the germ from which the body would be raised:

'From whence the learned sons of art
Os sacrum justly call the part.'
Butler's *Hudibras*, cant. ii. part iii.

SACY, ANTOINE ISAAC, BARON SILVESTRE DE, one of the most celebrated orientalists, was born at Paris in 1758. After being grounded in the classics, he commenced at the age of 12 the study of Hebrew, to which, as he advanced in years, he added the other branches of Semitic—Syriac, Aramaic, Samaritan, and finally Arabic. Persian and Turkish he acquired still later; but though one of the greatest masters of Arabic and Persian that ever lived, he never made much progress in Turkish. Modern European languages and jurisprudence formed collateral branches of his stupendous acquisitions. From 1781, he held various appointments under government, chiefly in the Mint. His first appearance in the world of letters dates from 1780, when he commenced to contribute to Eichhorn's celebrated *Repertorium*. In 1785, he was elected a member of the French Academy; and a number of monographs by him followed each other in quick succession in the Transactions of this body, chiefly on Arabic and Persian history, literature, and antiquities. In 1793, he published his first great work, the *Annales de Mirkhond*, translated, with an extensive commentary, from the Persian. In 1792, he retired from the service of the government, to devote himself exclusively to his favourite studies; in 1795, he was appointed to a Chair in the newly-founded Ecole des Langues Orientales; but refusing to take the oath of hatred against royalty, he was not allowed to teach. In 1803, when the Institute was completely reorganised, he took his seat there again; and shortly after was nominated Professor of Persian at the Collége de France. In 1808, he became a member of the Corps Législatif, and was subsequently attached to the Commission and Council of Public Instruction. In 1822, he was made Administrator of the Collége de France and the Ecole Spéciale des Langues Orientales; and in the same year he founded, with Abel Rémusat, the Société Asiatique. Under the new Orleans government, to which he soon attached himself, he was nominated Inspector of the Oriental Type of the Oriental Printing-office, and Perpetual Secretary of the Académie des Inscriptions. Yet, with these numerous offices on his shoulders, to all of which he attended most conscientiously, he never for one instant relaxed in his studies; and the number of his essays, memoirs, pamphlets, papers, &c., besides his larger works, is perfectly prodigious. He died, full of years and honours, in 1838, and was buried in the Père Lachaise. The Academy had a medal struck in his honour, and his bust was placed in the library of the Institute. Oriental studies owe to him more, almost, than to any other orientalist of our age. Irrespective of his own brilliant and numerous labours, he furthered and promoted his favourite science in every possible way—founding, or causing to be founded, oriental chairs in France; and forming such disciples as Freitag, Kosegarten, Rasmussen, Chézy, Quatremère, Jaubert, Saint-Martin, and others of more or less eminence as orientalists.

Among his works we would chiefly enumerate his *Grammaire Arabe*, the most classical work of its kind, and which has given Arabic studies an entirely new impulse, forming, as it were, the turning-point between the ancient and modern oriental philology. Next to this stands his *Chrestomathie Arabe*, with the *Anthologie Grammaticale Arabe*. Among his other writings are *Mémoires sur Diverses Antiquités de la Perse;* the translation of Abdollatif's *Egypt*, with notes; his editions of *Calila ve-Dimnah;* of the *Pendnâmeh*, with a French translation; the *Makamat* of Hariri; his *Mémoires sur l'Etat Actuel des Samaritains; Exposé de la Religion des Druses;* and his manifold contributions (above 400 in number) to the *Magasin Encyclopédique, Mémoires de l'Institut, Recueil de l'Académie des Inscriptions, Fundgruben des Orients, Annales des Voyages, Journal de la Société Asiatique, Biographie Universelle*, and Eichhorn's *Repertorium für biblische und orientalische Literatur, Revue des Deux Mondes, Moniteur*, &c.

SACY, SAMUEL USTAZADE SILVESTRE DE, son of the foregoing, a journalist, was born in 1801. In 1828, he became attached to the staff of the *Journal des Débats*, and has ever since remained faithful to its columns. His has been chiefly the polemical part; and it is supposed that, not omitting to take part in almost every public question, he has written about two-thirds of the political articles that have appeared for the last quarter of a century in that paper. From 1852, when the Empire was re-established, he relinquished politics, and became the principal reviewer of the paper. In 1854, he was elected member of the Academy. He is also administrator of the Mazarin Library. In 1858, he published a collection of his literary articles (*Variétés Littéraires, Morales, et Historiques*, 2 vols.), which are chiefly distinguished by sober judgment and facility and purity of style. He has also edited a number of works of a religious nature, with introductions; and is now publishing the Letters of Madame de Sevigné.

SA'DDENING, a peculiar method of applying certain mordants in dyeing and printing cloths, so as to give duller shades to the colours employed than those they ordinarily produce.

SA'DDLEBACK, one of the well-known mountains of Cumberland, is situated 4½ miles north-east of Keswick. It is 2787 feet high.

SA'DDLERY. Saddlery is next in importance to human clothing, being essential to the employment of horses, therefore its manufacture is carried

on in almost every town and village. England, however, exports large quantities of saddlery, nearly all of which is made at Walsall, in Staffordshire, or in the neighbourhood. The value of the exports of saddlery and harness amounts to nearly £400,000 per annum. A saddle consists of the wooden frame or *saddle-tree*, the *skirts* or padded *under-flaps*, the *upper-flaps* and *seat*, which are generally made of tanned pigskin, the *girth* or *belly-band*, the *stirrup-straps*, the *stirrups*, and the *crupper-loop*.

SA'DDUCEES (*Zedukim*), a Jewish school or party—not a 'sect,' as they have been generally denominated since Josephus—of the times subsequently to the Syrian wars, and often mentioned in the New Testament, the Talmud, and the Midrash. Their origin, as well as their name, has given rise to many speculations and suggestions, but none can be considered satisfactory. Modern investigators have derived the name from Zadikk, righteous man, a denomination which the S. are supposed to have assumed in contradistinction from the Pharisees, the Separatists, as designating their own rejection of all superfluous and exaggerated religious practices, and their stand upon the words of the law itself.

The tenets of the S. are noticed as contrasted with those of the Pharisees (q. v.).

A misconceived notion of some Church Fathers, to the effect that the S. rejected all the canonical books of the Old Testament, with the sole exception of the Pentateuch, hardly requires refutation. They held the whole of the Old Testament as sacred as the Pharisees, and they quote equally from all its portions in support of their views. They would, if this or any other of those exaggerated accounts of their 'unbelief' had any foundation, not have remained in the Sanhedrim, their members would not have been high-priests, and the Pharisees would not have fought against them about mere trifles and casuistically. But, on the other hand, their sober rationalism could not, apart from their aristocratic tendencies, at a time in which the immense struggle for liberty was still fresh in the people's minds, gain for them that popular sympathy which the Pharisees—eager, jealous, patriotic, pious, learned men of the people, enthusiastic men of progress—so easily acquired and held. Thus Sadduceeism, of which we hear so much in the New Testament, and which was combated as 'the leaven of Herod' by Christ, while he only inveighs, as does the Talmud, against the hypocrites among the Pharisees, died out soon after the 1st c. A. D. The term under which they are once mentioned in the Mishna, viz., Karaim, became, at a later period, the name of a Jewish sect, still in existence, who reject all tradition, simply holding by the Written Law as their guide. See KARAITES, JEWISH SECTS. The Talmud speaks of certain writings of the S, but nothing has survived. A criminal code of theirs, of a somewhat arbitrary nature, is mentioned in *Mes. Taan.* iv.

SÂDI, SHEIKH MUSLIH ADDIN, one of the most celebrated Persian poets, was born at Shiraz, about the year 1184. Little is known of the circumstances of his life. His father's name was Abdallah, and he was a descendant of Ali, Mohammed's son-in-law; notwithstanding his noble lineage, however, he held but an insignificant position. S. was early left fatherless. He received his education in science and theology at Bagdad, and from here he undertook, together with his master, his first pilgrimage to Mecca; a pilgrimage which he subsequently repeated no less than 14 times. He travelled for a great number of years, and is said to have visited parts of Europe, Barbary, Abyssinia, Egypt, Syria, Palestine, Armenia, Asia Minor, Arabia, Persia, Tartary, Afghanistan, and India. Near Jerusalem, 'where,' he says, 'I associated with the brutes,' he was taken prisoner by the Crusaders, not while fighting against them, but while practising religious austerities in the desert. He was ransomed for ten dinars by a merchant of Aleppo, who recognised him, and gave him his daughter in marriage: this union, however, did not prove happy. He married a second time, and lost his only son from that marriage. The latter part of his life S. spent in retirement near his native town, and he died, at a very old age, in 690 H., or 1263 A. D.; according to others, however, he did not die until 1291 or 1292 A. D. In person, he is described as having been of rather insignificant appearance, short, slim, and spare, nor is there much to be said for his personal prowess. His was a contemplative, pious, and, so to say, philosophical disposition. The years of his retirement from life he occupied in composing those numerous works which have made him justly famous through East and West. Although European critics would hardly be inclined to endorse to the full the judgment passed upon him by his countrymen, that he was 'the most eloquent of writers, the wittiest author of either modern or ancient times, and one of the four monarchs of eloquence and style,' yet there is no doubt that this 'nightingale of thousand songs' is deservedly held among the foremost masters of poetry, and that he fully merited the honours showered upon him by princes and nobles, both during his lifetime and after his death. A magnificent mausoleum, with a mosque and college attached to it, was erected in his honour at the gates of Shiraz, and the people, who soon wove a halo of legend around his life, flocked thither in pilgrimage; and so carefully is his tomb guarded, that when visited by Colonel Franklin in 1787, it was in the same state as when S. was buried.

The catalogue of his works comprises 22 different kinds of writings in prose and verse, in Arabic and in Persian, of which *ghazels* and *kassidas* (odes, dirges), form the predominant part. The most celebrated and finished of his works, however, is the *Gulistan*, or Rose-garden, a kind of moral work in prose and verse, consisting of eight chapters, on Kings, Dervishes, Contentment, Taciturnity, Love and Youth, Decrepitude and Old Age, Education, and the Duties of Society, the whole intermixed with a number of stories, maxims, philosophical sentences, puns, and the like. Next to this stands the *Bostan*, or Tree-garden, a work somewhat similar to the *Gulistan*, but in verse, and of a more religious nature. Third in rank stands the *Pend-Nameh*, or Book of Instructions. Elegance and simplicity of style and diction form the chief charm of S.'s writings. In wit, he is not inferior to Horace, with whose writings he, according to one source, may not have been unacquainted, since he is said to have known Latin. The first complete edition of his works, called the *Salt-cellar of Poets*, by Harrington, was published in Calcutta, 1791—1795, and has been reprinted since by native presses in India. The *Gulistan*, first edited with a Latin translation by Gentius (Amsterdam, 1651), has been reprinted very frequently, and has been translated into a number of European tongues, into English chiefly by Gladwin, Ross, and Eastwik. The *Bostan* was first published complete in Calcutta, 1828 (Vienna, 1858), and has likewise been translated into other languages.

SAFE-CONDUCT, a passport granted, on honour, to a foe, enabling him to pass where it would otherwise be impossible for him to go with impunity. Safe-conducts are granted in war for the purposes of conference, &c.; and to violate the

provisions of such a pass has always been esteemed a disgraceful breach of the laws of honour.

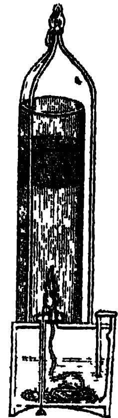
SAFE'D, a small town of Palestine, in the pashalic of Acre, and in the ancient province of Galilee, stands on a mountain 2500 feet high, twelve miles north of Tiberias. The inhabitants, about 5000 in number, are engaged in the manufacture of cloth and in dyeing, and the country in the vicinity is largely productive of wine and oil. It is an ardent wish of the Jews to die here, because they believe that the expected Messiah will make this place his capital. The Jews possess about thirty synagogues in the town, also a college for instruction in Hebrew and the Talmud. Prior to 1837, S. was a handsome town; but in that year it was partially destroyed by an earthquake, and 2000 Jews, 300 Mohammedans, and a number of Christians, were killed.

SAFES, FIREPROOF. The manufacture of iron safes for the preservation of money and valuable papers has become of great importance. Thief-proof safes have been in use for ages; but no really successful attempt at making safes to resist fire was made until Mr John Milner of Liverpool patented, in 1840, an ingenious invention by which steam was generated inside the safe upon the outside becoming intensely heated, and the saturation of the contained papers, &c. with the steam was found to be a protection from most ordinary fires. In order to effect this, the safes were made of thick plate-iron, with a lining of thinner iron from three to six inches from the outer plates; thus giving the whole safe, including the door, which was made to fit very exactly, a thickness of a good many inches. The interval between these outer and inner walls was filled up with hard wood sawdust, in which were packed a number of small tubes filled with water, and hermetically sealed, or crystals of alum or soda, containing 50 per cent. of water of crystallisation. In case of fire, and the safe becoming heated, the tubes burst, or the crystals melt, and saturate the sawdust with water, which becomes steam, and passes into the inner chamber of the safe, and thus protects the contents, if inflammable, from fire. These safes, in order to be effectual, must be made with very great care; and to make them secure against thieves, as well as fire, the locks must be of very superior construction.

SAFETY-CAGE. See MINING.

SAFETY-FUSE, a species of fuse invented by Messrs Bickford for use in the Cornish mines, and now generally employed in the chief mining districts, consists of a hollow cord of spun yarn or hemp, tarred on the outside to render it waterproof, and filled with tightly rammed gunpowder. This fuse ignites steadily at the rate of about two feet per minute, so that the time which elapses between the igniting of the fuse and the explosion of the powder in the chamber can be easily regulated by the length of the fuse. The use of this contrivance has contributed to prevent those accidents arising from premature explosions, which were formerly of very common occurrence in mines. The fuse-tube is sometimes made of gutta-percha.

SAFETY-LAMP. It has been long known that when marsh-gas or light carburetted hydrogen, which is frequently disengaged in large quantities from coal-mines, is mixed with seven or eight times its volume of atmospheric air, it becomes highly explosive, taking fire at the approach of a light, and burning with a pale blue flame. Moreover, this gas in exploding renders ten times its bulk of atmospheric air unfit for respiration, and the *choke-damp* thus produced is often as fatal to miners as the primary explosion. With the view of discovering some means of preventing these dangerous results, Davy instituted those important observations on flame which led him to the invention of the safety-lamp. He found that when two vessels filled with a gaseous explosive mixture, are connected by a narrow tube, and the contents of one fired, the flame is not communicated to the other, provided the diameter of the tube, its length, and the conducting power for heat of its material, bear certain proportions to each other; the flame being extinguished by cooling, and its transmission rendered impossible. In this experiment, high conducting power and diminished diameter compensate for diminution in length; and to such an extent may this shortening of length be carried, that metallic gauze, which may be looked upon as a series of very short square tubes arranged side by side, completely arrests the passage of flame in explosive mixtures. The following are Davy's directions regarding the structure of his lamp: 'The apertures in the gauze should not be more than $\frac{1}{22}$d of an inch square. As the fire-damp is not influenced by ignited wire, the thickness of the wire is not of importance; but wire from $\frac{1}{40}$th to $\frac{1}{60}$th of an inch in diameter is the most convenient. Iron-wire and brass wire gauze of the required degree of fineness, are made for sieves by all wire-workers but iron-wire gauze is to be preferred: when of the proper degree of thickness, it can neither melt nor burn; and the coat of black rust which soon forms upon it superficially defends the interior from the action of the air. The cage or cylinder should be made of double joinings, the gauze being folded over so as to leave no apertures. When it is cylindrical, it should not be more than two inches in diameter; for in larger cylinders, the combustion of the fire-damp renders the top inconveniently hot, and a double top is always a proper precaution, fixed at the distance of half or three-quarters of an inch above the first top. The gauze cylinder should be fastened to the lamp by a screw of four or five turns, and fitted to the screw by a tight ring. All joinings should be made with hard solder, and the security depends upon the circumstance, that no aperture exists in the apparatus larger than in the wire gauze.' The cylinder is protected by three external, strong, upright wires, which meet at the top; and to their point of junction a ring is attached, by which the lamp is suspended. The oil is supplied to the interior by the pipe projecting from the right side of the figure, and the wick is trimmed by a wire bent at the upper end, and passed through the bottom of the lamp, so that the gauze need not be removed for this process. (The wire is here shewn in the figure.) When a lighted lamp of this kind is introduced into an explosive mixture of air and fire-damp, the flame is seen gradually to enlarge as the proportion of light carburetted hydrogen increases, until at length it fills the entire gauze cylinder. Whenever this pale enlarged flame is seen, the miners should depart to a place of safety, for although no explosion can occur while the gauze is sound, yet at that high temperature the metal becomes rapidly oxidised, and might easily break; and a single aperture of sufficient size would then occasion a destructive explosion. In a strong current of air, the heated gas may be blown through the apertures of the


Safety-Lamp.

gauze before its temperature is sufficiently reduced to prevent an explosion; but such a contingency may be guarded against by placing a screen between the draught and the lamp. It was in the year 1815 that Sir Humphry Davy presented his first communication to the Royal Society respecting his discovery of the safety-lamp; and at the meeting held on January 11, 1816, the lamp was exhibited. Sir Humphry Davy's claim as an original discoverer was immediately challenged by various persons, amongst whom may be especially noticed the late Dr Reid Clanny of Newcastle, and the great engineer George Stephenson. Clanny's safety-lamp (which is described in the *Philosophical Transactions* for 1813) was based on the principle of forcing in air through water by bellows; but the machine was ponderous and complicated, and required a boy to work it; moreover, he had been anticipated by Humboldt in 1796 (Weld's *History of the Royal Society*, vol. ii. p. 288, note). Notwithstanding a report of the Royal Society, dated November 20, 1817, and signed by Joseph Banks, P.R.S., William Thomas Brande, Charles Hatchett, and William Hyde Wollaston, which is totally adverse to Stephenson's claims, there is undoubted evidence that, during the very months Davy was at work on the experiments which led to his invention, Stephenson's (familiarly called the *Geordie*) lamp was actually in use at the Killingworth mines. In its general principle it was the same as Davy's, the main difference being that the Stephenson lamp had a glass cylinder inside the wire-gauze cylinder, and that inside the top of the glass-cylinder was a perforated metallic chimney; the air being supplied through a triple circle of small holes in the bottom. On the subject of this controversy, the reader is referred to Smiles's *Life of George Stephenson*. Our limited space prevents us from noticing the various reports on 'Accidents in Mines' that have been published by different committees of the Houses of Lords and Commons, or from entering into any details regarding the modified forms of safety-lamps that have been since introduced. The best of these modifications are described in the article LAMP, SAFETY, in the 'Arts and Sciences Division' of *The English Cyclopædia*, from which we extract the following paragraph: 'Amidst much diversity of opinion concerning the relative merits of these various kinds of safety-lamp, there is a pretty general agreement that the gauze cylinder should be accompanied by one of glass, to resist the action of strong currents of air; and that the glass without the gauze is not sufficiently protected against fracture.'

Closely connected in its objects with the safety-lamp is a most ingenious invention which has been just patented by Mr Ansell of her Majesty's Mint. Its object is to determine, by a simple application of the law of osmotic force, the presence of light carburetted hydrogen in coal-mines; and the apparatus which Mr Ansell has devised promises to indicate the accumulation of fire-damp before it becomes dangerous, and either to give the miner notice of it, or to convey that notice to the surface by its connection with some simple electro-telegraphic arrangement. Mr Ansell gives two or three forms to his apparatus, of which the following is the most simple: A thin india-rubber ball is filled with atmospheric air, and is placed on a stand under a lever which slightly presses its upper surface. This lever is connected with a spring, which it liberates when, from any cause, the lever is raised; and the liberation of the spring sets a bell in vibration. If this trap for the discovery of fire-damp is set where that gas is present to any material extent, the noxious gas enters the ball by virtue of osmose, causes it to swell, and when the swelling has attained a certain point, the warning bell rings.

Attempts have at various times been made to use electricity as an illuminating agent in dangerous coal-mines, but until the recent discovery of Rhumkorff's induction coil, none of them have been successful. MM. Dumas and Benoit have now constructed an electric lamp founded on the advantages presented by Rhumkorff's machine and Geiseler's vacuum-tube; and they have made some trials with the lamp in several of the French collieries, which are stated to be successful, and M. Alphonso Dumas exhibited it at a meeting of the North of England Institute of Mines on February 4, 1865. For a description of the lamp, which, from its delicacy and weight (about 14 lbs.), can never supersede the ordinary safety-lamp, we must refer to the *Quarterly Journal of Science*, No. 6, April 1865, p. 387. Under circumstances of extreme danger, this lamp may, however, be very useful, as an explosive atmosphere may be entered in safety, with the advantage of a sufficient light for the purpose of examination. The light is by no means brilliant, but presents the character of a rich phosphorescent glow.

SAFETY-VALVE is a circular valve placed on an opening in the top of a steam-boiler, and kept in its place either by means of weights piled above it, by a lever of the second kind, with a weight capable of sliding along the arm, or by a lever and spring. In stationary engines, one valve is frequently found sufficient, and the pressure on the valve is produced in the first or second of the methods indicated above. In locomotive engines, on the contrary, there are always two loaded valves: one, called the *lock-up valve*, from its being out of the engineman's reach and control, is placed well forward on the top of the boiler, and kept down by weights; the other, on the hinder part of the top of the boiler, is for safety subjected to a less pressure than the lock-up valve, and is acted on by a lever and spring. The term 'safety-valve' is particularly appropriate to this invention; for whenever the tension of the steam rises above a certain amount (= the weight in pounds with which the valve is held down divided by the area in inches of the undersurface exposed to the steam), the valve is forced upwards by the superior pressure beneath, steam escapes, and the pressure on the boiler being thus relieved, the valve sinks to its place. The only precaution necessary is to be sure that the valves are not too heavily loaded or fastened; and wilful indifference, or disregard of this caution, has, especially in the case of American river-steamers, been productive of the most serious casualties.

SA'FFI, AZAFFI, or ASFI, a seaport of Northern Africa, in the kingdom of Morocco, and 107 miles west-north-west of the city of that name. It is surrounded by waste and desert land; and its inhabitants, about 12,000 in number, of whom 3000 are Jews, are said to be the wildest, greediest, and most fanatical of the kingdom. It was at one time the chief seat of the trade with Europe, and though it has declined with the rise of Mogadore, it still exports silk, wool, leather, gum, and goat-skins.

SA'FFLOWER (*Carthamus tinctorius*), a plant of the natural order *Compositæ*, allied to Thistles (q. v.), but distinguished by its heads of flowers having only hermaphrodite florets, and the fruit having four ribs, and no pappus. It is an annual, 2—4 feet high, branching towards the top; flowers dark orange, or vermilion. It is a native of the East Indies, from which it was probably introduced

in a remote age into Egypt and the Levant, where it is now naturalised. It is extensively cultivated in France, and the more southern parts of Europe, and even in some parts of South America, chiefly on account of the corollas of the florets, which are used in dyeing yellow and red. In France, it is drilled or sown broadcast in the beginning of May. The plants are thinned to five or six inches apart; and the flowers are picked by the hand in dry weather, and very carefully dried on a kiln, under pressure, and are thus formed into small round cakes, in which state S. appears in the market. The S. of Persia is generally esteemed the best; but India yields the chief part of that imported into Britain. From its resemblance to saffron, S. is sometimes called *Bastard Saffron*, and it is used to adulterate saffron. The yellow colouring matter of S. is a kind of extractive. The red colouring matter is Carthamine (q. v.). The colouring matter of Rouge (q. v.) is derived from Safflower.

The seeds of S. are bitter and very oily. They are greedily eaten by parrots and many other birds. They are sometimes used as a purgative. The oil which they contain is employed in the East Indies in cases of rheumatism and paralysis.

SA'FFRON, a colouring material, consisting of the dried stigmas of the common yellow crocus, so abundant in our gardens in early spring. It was introduced into Europe from Asia Minor, and is largely cultivated in several countries, but chiefly in Spain. In England, the crocus was unknown until 1339, when it was introduced from the East by a pilgrim; and in 1582 it was extensively cultivated for yielding S., especially in Essex, at the place now called, in consequence, Saffron-Walden. Its cultivation in Britain has almost entirely ceased, and the S. used is imported. S. is not only valuable as a colouring material, but has from very early ages had a great medicinal reputation. Homer mentions it, and Solomon associates it with spikenard and other precious drugs and spices. A large portion of the supply in ancient times was yielded by Cashmere, where it is still extensively cultivated. In addition to its other properties, it is often used as a perfume, and in flavouring as well as colouring confectionary and other articles of food. These latter are now its chief uses in Britain, where its medicinal value has long been declining. The colour yielded by S. is a bright golden yellow, and is due to a peculiar principle called *Polychroite*. Its great solubility in water prevents its being used as a dye for fabrics; but its agreeable flavour, and the absence of all injurious qualities, render it of great service in colouring articles of food.

The *S. Crocus* (*Crocus sativus*; see CROCUS) differs from most of the species of that genus in flowering in autumn, not in spring. It has large deep purple or violet flowers, with the throat bearded, and the long drooping trifid stigma much protruded from the tube of the perianth. The stigmas are the only valuable part of the plant.

In its cultivation, the corms are planted in the beginning of summer in rows six inches apart, and three inches from bulb to bulb; the most suitable soil being a sandy loam, very thoroughly tilled. The stigmas are gathered by women and children, and are spread out on cloth or paper, and dried in the sun, or in kilns or drying-houses. The produce of an acre of S. is about 5 pounds the first year, and 24 pounds the second and third year, after which the plantation must be renewed. But an ounce of S. sells for at least £2.

SA'FFRON-WA'LDEN, a market-town and municipal borough of England, in the county of Essex, 24 miles north-north-west of Chelmsford. The church is an elegant specimen of late Perpendicular. The free grammar-school has an income of £60 a year. The chief trade is in barley, malt, and cattle. Pop. (1861) 5474.

SA'GA, an old Norse word, used to denote a tale which, originally dependent on, and gradually elaborated by, oral tradition, had at last acquired a definite form in written literature. Such sagas (Norse *Sögur*), along with poetical and legislative writings, constitute the chief part of the old Norwegian-Icelandic literature. They have been divided into historical and legendary. The latter embrace partly stories universally current about heroes of the Teutonic race (e. g., the *Völsunga-Saga*), and partly stories peculiar to the Norse or Scandinavian peoples (e. g., the *Frithjofs-Saga*); while the former handle the events and personages of Norwegian and Icelandic history from the 9th to the 13th c., in numerous biographies and family records. To Danish history belong the *Knytlinga Saga* and *Jomsvikinga-Saga*; to Swedish, the *Ingvars-Saga*; to Russian, the *Eymunds-Saga*. The Faröe Islanders and the Orcadians have also their own sagas. After the middle of the 14th c., when the motley literature of the church began to exercise an influence, tales were translated from foreign languages into Norse, e. g., the story of *Barlaam and Josaphat* (q. v.), which also received the name of sagas. Bishop P. E. Muller, in his *Sagabibliothek* (Copenh. 1817–1820), was the first who subjected the whole subject of saga-literature to a critical treatment. Since his time, collections both of the historical and legendary sagas, with critical apparatus more or less complete, have appeared in all the countries of the north.—The German *Sage* is the same word, and expresses fundamentally the same idea as the Norse *saga*. The difference is this, that the Germans do not restrict its application to the legendary or traditional literature of their own country, but extend it to that of others.

SA'GAN, a town of Prussian Silesia, 48 miles north-west of Liegnitz, on the Bober, and on the Hannsdorf and Glogau Railway. Pop. (1862) 9072, who manufacture cotton and woollen cloths, and paper, and trade in yarn, cattle, and corn. In the manufacture of woollen cloths alone, 1600 men are employed.

SAGE (*Salvia*), a genus of plants of the natural order *Labiatæ*, and containing many species, herbaceous and half-shrubby. There are only two perfect stamens, the filaments of which bear at their summit a cross thread—the much elongated *connective*—fastened by a joint, and having one cell of the anther at the upper end, and the other but imperfect cell at the other end. The seeds of many of the species, when steeped in water, become covered with a mucilaginous slime, like quince seeds.—COMMON S., or GARDEN S. (*S. officinalis*), grows on sunny mountain slopes and rocks in the south of Europe, and has long been in general cultivation in gardens. It is a half-shrubby plant, seldom more than two feet high, with ovate-oblong or lanceolate, finely notched, curiously wrinkled, whitish-gray leaves, and racemes of purplish blue, rarely white or red flowers. The whole plant has a peculiar, strong, penetrating aromatic smell, somewhat resembling that of camphor, and a bitterish, aromatic, somewhat astringent taste. It contains much essential oil (*Oil of S.*), which has been sometimes used in liniments for rheumatism. *S. leaves* are much used in flavouring dishes, and in sauces, &c. The leaves and young shoots are used for astringent tonic gargles. *S. tea*, made of the dried

roots, is a popular astringent and tonic, in a dry soil, and is easily propagated cuttings.—CLARY (q. v.) is a species of ow CLARY, or MEADOW SAGE (*S. pra-* mmon ornament of meadows and borders most parts of the continent of Europe, south of England. It has bluish purple is sometimes fraudulently put into beer, more intoxicating.—The APPLE-BEARING *ifera*) is a native of the south of Europe he East, remarkable for its very large purple bracts, and for the large gall-nuts ow on its branches, as on the leaves of the which are known as *S. Apples*, have an e aromatic taste, and are brought to market en.—Some of the species of *Salvia* have very ful flowers, and are prized ornaments of s and greenhouses.

GHALIEN, spelled in all Russian accounts alin (q. v.).

'GINAW BAY, an arm of Lake Huron, ds south-west, and forms an important inden- n of the shore of Michigan State, U.S. It is 60 les long by 30 wide, with several fine harbours d picturesque islands. The water, like that of e whole lake, is of wonderful clearness and purity. he bay is named from the river Saginaw which alls into it.

SAGO is the starch produced by several species of palms, prepared in a peculiar manner. The species from which it is chiefly prepared are *Sagus lævis*, *S. genuina*, and *Saguerus saccharifer*, in the Indian Archipelago; *Caryota urens*, in Assam; *Phœnix farinifera*, on the Coromandel coast; and the Talipot Palm (*Corypha umbraculifera*), in Ceylon. Several other species are occasionally used, and there is some reason to believe that some plants of the genus *Cycas* (natural order *Cycadaceæ*) also yield sago. It is in all cases produced from the large mass of pith which fills the interior of the stems, therefore the trees require to be cut down. The stems are cut into lengths, split open, and the pith dug out, cut small, placed in a trough, and worked with clean water, to wash out the fecula; this makes the water white and turbid, and it is then run off into another vessel. Fresh washings of the pith take place, until it ceases to yield any starch. The water of the separate washings being all added together, is allowed to settle, and the starch is soon deposited: the clear supernatant water is then run off, and the deposit dried. This is the ordinary *Sago Flour* of commerce, of which large quantities are now imported for use as starch in the calico and other manufactures. When prepared for food, it is either in the state called *Pearl Sago*, or *Granulated*. The former is in little spherical grains of a pearly-white lustre, varying in size from that of a poppy-seed to a grain of millet. Granulated sago is also in round grains, but of a larger size, sometimes nearly as large as a pea. There are several varieties, differing much in colour—some quite white, others having the peculiar reddish-brown of radish-seed, which they strikingly resemble in appearance. One kind of granulated sago from India has lately been introduced into our shops under the erroneous name of Tapioca, from its having been called by the French *Sagou-tapioka*.

The exact method employed by the Malays in pearling and granulating their sago, is not known to Europeans; but there are strong reasons to believe that heat is employed, because the starch is partially transformed into gum. It is not entirely soluble in hot water, like ordinary starch, hence it can be employed in making puddings, &c., and in this way forms a valuable article of food, being cheap, light, nutritious, and easy of digestion. The quantities imported into Britain in 1863—1864 were as follow: From Borneo, 1054 tons; India, Singapore, and Ceylon. 6196 tons; other parts, 56 tons: total, 7306 tons; the estimated value of which was £116,634.

SAGOU'IN (*Callithrix* or *Saguinus*), a genus of American monkeys, having a long but not prehensile tail, a small and rounded head, short muzzle, and large ears. They are of small size, and remarkably active and graceful in their movements. They are sometimes called *Squirrel Monkeys*. They are of very gentle disposition, and when tamed, become strongly attached to their masters. Both body and tail are covered with beautiful fur. The SIAMIRI or TEE-TEE (*C. sciureus*), a native of Brazil and Guiana, is one of the best known species.

SAGUNTUM, a wealthy and warlike town of ancient Spain, in Hispania Tarraconensis, stood on an eminence near the mouth of the Pallantias (modern Palancia). Its site is now occupied by the town of Murviedro (q. v.). Founded (according to Strabo) by Greeks from Zacynthus, it became at an early period celebrated for its commerce, and attained to great wealth. But it owes its historical vitality to the circumstance of its siege and destruction by the Carthaginians, under Hannibal, in 218 B.C. Having withstood the siege for the greater part of a year, against an army amounting to about 150,000 men, led by a general of consummate ability and indomitable resolution, the Saguntines, now most severely pressed by famine, concluded, with an act of heroic defiance and self-sacrifice, a resistance that had been characterised by the most brilliant valour. Heaping their valuable effects into one vast pile, and placing their women and children around it, the men issued forth for the last time against the enemy; and the women, setting fire to the pile they had prepared, cast themselves upon it, with their children, and found in flames the fate their husbands met in battle. The destruction of S. directly led to the second Punic war.

SAHA'RA. The immense tract of country to which this name is commonly given, has already been described under the heading AFRICA (q. v.). But the term Sahara is more correctly applied to a region of much more limited extent. The natives divide Africa north of the line into three portions—the Tell, the Sahara, and the Desert. The Tell extends from the Mediterranean to the Atlas Mountains; the Sahara, from the Atlas to the southern region where all regular supply of water fails; and the Desert, from the southern, and not very clearly defined frontier of the Sahara, southward almost to the water-shed of the Niger, comprising a district salt and arid, inhospitable to man and beast, although the camel may even here snatch a scanty subsistence. As to physical geography, the S. may be subdivided into the following districts—1. The Hauts Plateaux, or Steppes, a series of high levels skirting the base of the Atlas Mountains. 2. The land of the Dayats or waterless oases, stretching south to the high lands on the south bank of the Wed Mzi or Djidi. 3. The region of the southern oases, to the south of the former, and extending south till it loses itself in the Desert. The principal feature of the S. is the Wed Mzi, which rises in the Djebel Amour, and after an east, north-east, and finally south-east course, falls into the Chott Melr'hir. Throughout almost the whole of its course, which is about 400 miles long, it flows under ground. Its waters seem to rest on a bed of hard limestone from 30 to 60 feet below the surface. —Tristram's *Great Sahara* (John Murray, Lond. 1860).

SAHIB (an Arabic word meaning a companion, a master, a lord) is, in Hindustani, the usual designation and address of a respectable European, equivalent to Mister, Sir, &c. Hence, *Sahibâ* is the term for Lady, Madam. In Bengali and Mahratti, the word assumes the form *Saheb.*

SAIDA. See SIDON.

SAIGA. See ANTELOPE.

SAIGON, one of the finest river ports in Asia, the capital of the French possessions in Lower Cochin China, stands on a small river of the same name, about 35 miles from the Chinese Sea. The city is fortified, and its value as a strategical position is unquestionable. By land it is defended from attack by many miles of jungle and swamp, and the approach from the sea on the south by the fine river Donnai, could easily be rendered impassable to the strongest fleet. The entrance to the Donnai is at Cape St Jacques, and its winding course to S., through a rich level country, is from 50 to 60 miles in length, and might be defended by fortifications at every point. It is of easy navigation and is of sufficient depth to allow vessels of the heaviest burden to sail close to its banks under the overhanging foliage. The breadth of the river from S. to the sea varies little, but it is never narrower than the Thames at London. It is joined on both sides by many large affluents, and it is the main channel of a river system that covers the whole country to the south of the capital with a network of water-courses. The city of S. is fortified, and is defended by a permanent force of several large ships of war and a garrison of 10 000 men. At the beginning of this year (1865) the law of conscription, by which one man in seven is chosen from among the natives for military service, was already in force. S. consists of two parts: the Chinese town, four miles inland, filled with an active population busily engaged in trade, and the European, or fortified town on the banks of the Saigon. The latter, with its fleet of vessels riding at anchor in mid-stream, is already of considerable size. Good roads have been constructed for many miles around, and there are barracks, hospitals, official residences, and other buildings for public purposes. The soil, only about one fourth of which is under cultivation, is abundantly fertile, and is admirably suited to the production of cotton, sugar, indigo, and tobacco, besides rice, which is at present the principal, and almost the only, exported product. Its forests contain magnificent timber, and abound in woods rich in dyes. There is a naval yard and arsenal, and shipbuilding is carried on. Pop. estimated at 180,000.

S., together with the territory of which it is the capital, was taken by the French in 1860. Treaties of peace and commerce have been concluded with the Anamite government, from which the colonial government derives great advantages. These treaties, signed 15th July 1864, provide that the protectorate of the six provinces of Lower Cochin China shall remain in the hands of France; that three important ports on the coast of Anam shall be opened; and that a space of nine kilometres on the shore of each port shall be conceded to the French for the establishment of factories; that French merchants and missionaries shall be allowed to traverse the kingdom of Anam without hindrance, and that an indemnity of 100 millions of francs shall be paid. By these treaties the French still protect, though they do not *formally* at least possess the six provinces of Cochin-China, but they retain vast tracts of territory at S., at Cape St Jacques, and at Mytho, and remain masters of the rivers Saigon and Cambodia.

SAIL. A sail is an expanse of canvas, or other strong material, on which the wind may exert its force and propel the vessel. It is extended by means of a mast or yard, or both, may be of various shapes, and of any size suited to the carrying power of the vessel. A ship of shallow draught or of narrow beam can carry comparatively little sail, while a vessel of proportionately deep draught and heavily ballasted

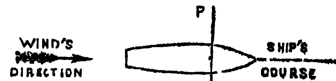


Fig. 1.

yacht—or a vessel of great breadth of beam—can carry sail of great area. A sail acts with greatest power when the wind is directly astern, as in fig. 1, but it can be applied, though with less strength, when on either beam. The action of the wind on an oblique sail is a good example of the resolution of forces. See COMPOSITION AND RESOLUTION OF FORCES, &c. Let TD, fig. 2, be the ship, PAS its sail, WA the direction of the wind, and let the length of WA represent the pressure of the wind on the sail. WA can be resolved into AB, perpendicular to the sail, and BW parallel to it, the latter of which has no effect in pressing on the sail; therefore AB is the effective pressure on the sail. Were the vessel round, it would move in the direction BA. Let BA be resolved into CA and BC, the former CA, acting in the direction of the keel or length of the vessel, or in the direction CAD, and the latter perpendicular to it, or in the direction of the breadth. The former pressure, CA, is the only pressure that moves the vessel forward; the other, BC, makes it move sideways. From the form of the vessel, however, this latter force, BC, produces comparatively little lateral motion; any that it does occasion is called *leeway*. It results, therefore, that with the wind exerting an oblique pressure, the actual progress will be to the power of the wind only as CA to WA.

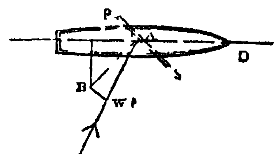


Fig. 2.

In the East and the Mediterranean, sails are frequently made of strong matting, but among northern nations, and for ocean navigation, very strong cloth, or canvas, called *sailcloth,* is usually resorted to. It is woven narrow, and the many breadths in the sail are joined by carefully made double seams.

Sails are nearly always either triangular or quadrilateral, but not necessarily equiangular. The

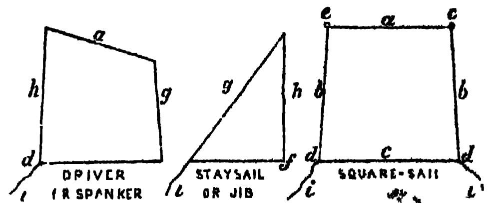


Fig. 3.

a, head; *b,* leech; *c,* foot; *d,* clew; *e,* earring; *f,* tack; *g,* fore leech; *h,* after-leech; *i,* sheet.

commonest forms are shown in fig. 3. To give greater strength a strong rope or cord is sewn into

the outer edge all round the sail; this rope has eyes in it, to which the various ropes employed in connection with the sail are fastened. The top of a sail is its *head*; the bottom, its *foot*, and the sides are *leeches*, the upper corners are termed *ear-rings*, the lower corners of a square sail, and the after lower corner of other sails, *clews*, the front lower corner of a fore and-aft sail is the *tack*. The ropes from the lower corners, used in tightening the sail against the wind, are the *sheets*

The sails of a ship are either 'square' or 'fore-and aft' The square sails—beginning from below—are, the *course*, the *topsail*, the *topgallant sail*, the *royal*, and, though very rarely used, the *sky scraper*. Each has the name of the mast on which it is set prefixed, as 'fore-topsail,' 'main-ro[yal],' &c. The square-sails are made fast by their he[ads] to yards, the foot being drawn to the extre[mities] of the yard below. Fore-and-aft sails are [the] *spanker* or driver, extended by the gaff at its he[ad], boom at its foot, and mast on its fore-leech; [the] *staysails*, which are suspended by rings to the sta[ys]; and the *Jibs* (q v) In a three masted vessel, the sails of most importance are the main-course, the spanker, the topsails, the fore staysail, and the jib, which can usually be all distended to the full without taking wind from each other. In very light winds, when every breath is of consequence, the area of the sails is increased by setting the *studding-sails*, which are oblong sails set on each side of the

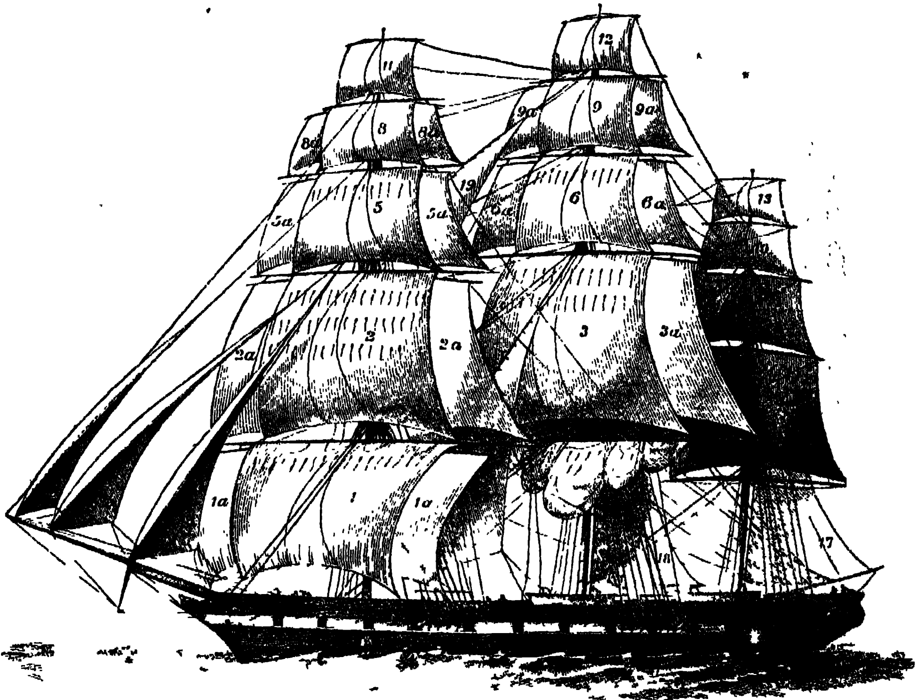


Fig. 4

1, Course; 1*a*, Studding-sails 2 Fore topsail 2*a*, Studding sails 3 Main topsail, 3*a*, Studding sails, 4, Mizen-topsail; 5, Fore-topgallant sail, 5*a*, Studding sails 6 Main topgallant sail 6*a* Studding sails, 7 Mizen topgallant-sail, 8, Fore-royal-topsail; 8*a*, Studding sails, 9 Main royal topsail, 9*a* Studding sails 10 Mizen royal topsail, 11, Fore skysail-topsail; 12, Main-skysail topsail, 13 Mizen skysail topsail, 14 Fore topmast staysail jib 15 Jib, 16, Flying jib, 17, Mizen spanker; 18, Spenser, 19, Main royal staysail, 20, Main topgallant staysail 21, Mizen royal staysail.

square-sails, on short booms run out beyond the yards of the latter Fig 4 represents a square rigged ship with the whole of her canvas shewn

In small craft and boats the most common sail is a lugsail (see LUGGER), which is a small square sail, occasionally supplemented by a shoulder of mutton (triangular) sail on a shorter mast at the stern Cutters or sloops carry a large spanker, with a topsail of similar shape, and jibs, some having the power of setting a large course when the wind is astern; but it is obvious that the course and spanker cannot be used together A schooner uses the same sails as a cutter, except that, in one form, she carries a square topsail and topgallant-sail on the foremast.

Sails are furnished with rows of short ropes for the purpose of *reefing* them, when their area is too large for the wind. The effect of a sail is increased by wetting it, as the pores of the canvas close more tightly through the swelling of the hemp.

SAILCLOTH, a very strong fabric, woven generally with linen yarn, but in America it has been made wholly of cotton, and in this country, under Armitage's patent, of cotton and linen mixed. Hair—such as of the ox, horse, and deer—has also been used, under Taylor's patent, in 1832, but without success. Linen and hempen cloths are those generally used in all parts of Europe.

SAILINGS, the technical name in Navigation for the various modes of determining the amount or direction of a ship's motion, or her position after having sailed a given distance, in a given direction. The direction of a ship's motion is her *course*, and is expressed in terms of the angle between the line of direction and the meridian; the length of her

path is the *distance;* the distance in nautical miles, made good to the east or west, is the *departure,* and is measured along a parallel; the *difference of latitude* is an arc of the meridian intercepted by the parallels, one of which passes through the place sailed from, the other through the place sailed to; and the *difference of longitude* is an arc of the equator intercepted by meridians through the same two places. It will at once be seen that if a ship sails along a meridian, the difference of latitude becomes the course, and there is no departure or difference of longitude; and that if it sails along a parallel the departure will be the same as the distance, and there will be no difference of latitude. The two general questions which present themselves to the navigator for solution, are—1. Given the course and distance from one place in given latitude and longitude to another place, find the latitude and longitude of the other; and 2. Given the latitude and longitude of two places, find the course and distance from the one to the other. The simplest way in which such problems can be solved is by the method known as *plane sailing,* a method, however, which is only roughly approximate, assuming, as it does, that the surface of the sea is a plane; it is consequently applicable only to short distances and low latitudes where the meridians are nearly parallel. According to 'plane sailing,' the elements of a ship's path are represented by a right-angled plane triangle, as ABC (fig.), where AB is the distance, the angle BAC the course, AC the difference of latitude (AC being a portion of a meridian, and BC of a parallel of latitude), and BC the departure. The two problems given above are in this method merely simple cases of the resolution of a right-angled plane triangle (see TRIGONOMETRY), for if the course and distance are given, the *dif. of lat.* = distance × cos. of course, and *dep.* = dist. × sin. of course; while the idea of *dif. of long.,* as distinct from dep., is quite inadmissible, since the method presupposes that the ship is sailing on an absolutely flat plain. If the ship does not stand on one course, but changes from time to time, the calculation of her final position may be effected, either by the previous method, repeated for each change of course, or more conveniently, by the method of *traverse sailing.* This method consists in the resolution of a ship's course and distance into two courses and distances, the courses being in the direction of some of the four cardinal points of the compass; thus, a ship which has sailed S.-W.-by-S. for 24 miles, has made 20 miles of *southing,* and 13·3 miles of *westing.* The *traverse table* has consequently six columns, the first containing the courses; the second, the corresponding distances; while the third and fourth contain the difference of latitude for each course, which, if N. is put in one column, and if S. into the other; the fifth and sixth columns, marked respectively E. and W., contain in a similar manner the departure for each course. When the table has been made out for the various courses and distances, the columns of dif. of lat. and departure are summed up, and the difference between the third and fourth, and between the fifth and sixth columns, gives the dif. of lat. and departure between the place sailed from and the place arrived at, from which the course and distance made good can be calculated as before. When a current interferes in any way, either by accelerating or retarding the ship's motion, its effect is estimated as in traverse sailing, as if it were one course and distance, the *set* of the current being the course, and its *drift,* i. e., its rate per hour multiplied by the number of hours it has affected the ship, the distance.

Parallel Sailing may be employed when a ship sails between two places, on the same parallel of latitude, in which case, if her head be kept accurately and constantly in an east or west direction, she will describe an arc of the parallel between the two places. As in this sailing the departure is the same arc of the parallel that the difference of longitude is of the equator, the *dep.* (which is now the *distance*) = *dif. of long.* × *cos. of lat.* The other elements are found as in plane sailing.

Middle Latitude Sailing is the application of the principle of parallel sailing to the case in which the ship's course is not perpendicular but oblique to the meridian; it is merely an approximate method, coming very close to a true estimate in low latitudes for any course, and in all latitudes for a course nearly E. and W. (i. e., one in which the distance is large as compared with the difference of latitude), but erring widely under other circumstances, though errors may be diminished as much as we please by dividing the distance into portions, and calculating the dif. of long. for each. The object of this sailing is to deduce the dif. of long. from the dep., and *vice versâ,* on the supposition, that the whole departure has been made good along the parallel of latitude which is equidistant from each extremity of the course, a method which, at first sight, would seem to give a correct result, and would do so if the parallels of latitude increased uniformly, which they do not. The dep., when laid off along the parallel of middle latitude, always gives the dif. of long. too small, and hence the limitations above noticed. When the latitudes are of the same name, the middle latitude is half their sum; but when of contrary names, it is better to find the dif. of long. for the portion on each side of the equator separately, the two middle latitudes being respectively half the latitude of the place sailed from, and half that of the place sailed to. The formulas are the same as for parallel sailing and plane sailing.

Mercator's Sailing is a perfect method of obtaining the same result as is found approximately by middle latitude sailing, but in the former case the dif. of long. is found from the departure, while in this method, the difference of latitude is employed for the same purpose. A table of meridional parts, as it is called, is necessary; this table shews the number of minutes in Mercator's projection (see MAP) corresponding to each degree and minute of latitude up to 78°, and is employed as follows. The latitude sailed from, and that reached, being known or found, the meridional parts for each are obtained, and their difference, if the latitudes are of the same name, or sum if of opposite names, gives the dif. of lat. We have then a right-angled triangle, with the dif. of lat. and dif. of long. forming the two smaller sides, and the vertical angle representing the course, whence *dif. of long.* = *dif. of lat.* × *tan. of course.* This sailing is the one most generally employed by navigators, but is inferior in practice to middle-latitude sailing, in the cases noticed under that head, for though it be a perfect, and the other merely an approximate method, yet a small error in the course (if large), or in the dif. of lat., becomes greatly magnified in the dif. of long.; while in the case of the latter, a considerable error in departure is hardly magnified, and a large error in the course (if nearly E. and W.) becomes imperceptible in the dif. of long. It is, however, better to work the problem according to both methods, and then estimate the true result as nearly as possible.

Great Circle Sailing (q. v.), the most perfect of all methods for finding a ship's course, is separately noticed. See also SPHEROGRAPH.

The obstacles that interfere with the correctness of the mariner's calculations are chiefly those which affect his data, the course and distance, the more important being the magnetic deviation of the compass produced by the attraction of the ship, errors in the estimated leeway or in the set and drift of currents, &c.; all of which require to be taken into account. The necessity for frequently checking the *Dead-reckoning* (q. v.), by means of astronomical observations, is sufficiently apparent.

SAI'NFOIN, or SAINTFOIN (*Onobrychis sativa*), a plant of the natural order *Leguminosæ*, suborder *Papilionaceæ*, of a genus nearly allied to *Hedysarum* (see French Honeysuckle), but having one-seeded pods, which are marked with wrinkles or pits, and are more or less prickly-toothed at the margin. It is a spreading perennial, about 2 or 3 feet high, with leaves of 9–15 smooth acute leaflets, and spikes of



Saintfoin (*Hedysarum onobrychis*).

beautiful flesh-coloured flowers, striated with rose-red, on long stalks. It is a native of the continent of Europe and of the south of England, and is much cultivated as a fodder-plant in dry, and particularly in calcareous soils, to which it is admirably adapted. Its cultivation was introduced into England in 1651; and before the introduction of turnip-husbandry, the sheep-farmers of the chalk districts depended almost entirely upon it, as they still do to such a degree, that in many leases there is a stipulation for the tenant's leaving a certain extent of land in sainfoin. It is, however, a very local crop, being scarcely cultivated on any but the most calcareous soils, where nothing else is nearly equal to it, although it has been found to succeed well on any soil sufficiently dry. There is no more nutritious fodder than S., whether for sheep, oxen, or horses. Even the dry stems of a crop which has produced seed are readily consumed by cattle, if cut into small pieces. S. sometimes endures for 10, or even 15 years on the same land—more generally only for 4 to 7 years; and in the eastern counties of England it is often sown instead of clover on light and somewhat calcareous sands and sandy loams, and the ground is ploughed again in two or three years.—The name S. is perhaps rather *Sang-foin*, from the blood-colour of the flowers, than *Saint-foin* (Holy Hay).

SAINT A'LBANS. See Albans, Saint. (Other names beginning with *Saint*, and not given under that word, will similarly be found under the other part of the name).

SAINT AMAND, a town of France, in the dep. of Cher, stands on the right bank of the river of that name, 27 miles south-south-east of Bourges. It carries on a trade in iron, and contains important iron-works. Pop. (1862) 7825.

SAINT AMAND, a small town of France, in the dep. of Nord, 8 miles north-west of Valenciennes. The town contains hot sulphur-springs; flax of superior quality is cultivated; and lace, clay-pipes, and porcelain are manufactured. Pop. (1862) 6739.

SAINT ANTHONY'S FIRE. See Anthony, Saint.

ST ARNAUD. See Leroy.

SAINT AU'GUSTINE, an ancient Spanish town on the east coast of Florida, U.S., is built on the western shore of an estuary 2 miles from the Atlantic, 160 miles south of Savannah. It enjoys a mild and equable climate, and is a resort for consumptive invalids. It was founded in 1565, and is the oldest town in the United States. Pop. (1860), 1175.

SAINT AU'STELL, a small town of Cornwall, 13 miles north-east of Truro by railway. Woollen goods are manufactured, and at the bay of Saint Austell, from which the town is about a mile distant, there is a pilchard-fishery, and tin and copper are exported. Pop. (1861) 3825.

ST BEES, an ancient village of Cumberland, pleasantly situated on the bay formed by *St Bees Head*. It is 4 miles south of Whitehaven, and about 10 miles beyond the limits of the Lake district. St Bees is a station on the Whitehaven and Furness Junction Railway. The parish is very large, comprising town and port of Whitehaven, village of St Bees, and several chapelries and townships. The village of St Bees contains about 1000 inhabitants. According to tradition, preserved by the early chroniclers, St Bees originated in a nunnery founded here, 650 A.D., by an Irish saint named Bega, of whom Sandford's MS. (in the Dean and Chapter Library, Carlisle) records a very pretty legend. It appears to have been destroyed before the reign of Henry I., in whose time we find that Ranulph Earl of Cumberland reconstituted it as a priory; but after the dissolution of the monasteries, it went to ruin. The institution known as St Bees College was established in 1816 by Dr Law, then Bishop of Chester, to supply a systematic training in divinity to young men desirous of ordination, whose means were inadequate to defray the expenses of a university education. The bishops of the province of York had previously been compelled to ordain a number of such men as literates, the poverty of many of the northern benefices not securing a sufficient supply of graduates. A portion of the ruined priory of St Bees was fitted up by the Earl of Lonsdale as lecture-rooms, library, &c. On the recommendation of the bishop, an incumbent was selected for the perpetual curacy of St Bees (value, £100 per annum) by the patron, the Earl of Lonsdale, with a view to his holding the position of Principal of the College in connection with the living. The following persons have held this office—viz., Rev. W. Ainger, D.D., Fellow of St John's College, Cambridge, appointed 1816; Rev. R. P. Buddicom, M.A., Fellow of Queen's College, Cambridge, appointed 1840; Rev. R. Parkinson, D.D., Canon of Manchester, appointed 1846; Rev. G. H. Ainger, D.D., Fellow of St John's College, Cambridge, appointed 1858. The Principal selects his own staff of lecturers. The expenses are defrayed from the fees paid by the students—£10 each term. The College

[co]urse extends over two years, each divided into [tw]o terms, from about January 28 to May 5, and [A]ugust 25 to December 5. During this period, the [st]andard English divinity works, with the Greek [T]estament, are chiefly studied, and the composition [o]f sermons, &c., practised. The students reside in [l]odgings in the village, under the control of the Principal, and attend the service daily in the parish church, the transepts of which were restored in 1855 for their accommodation. A new lecture-room and library were built in 1863, adjoining the ancient structure. Students are admitted at the age of 21, on producing testimonials of character, &c., satisfactory to the Principal. Graduates of a university where there is no divinity course, are admitted to the second year's course on producing their diploma, along with the usual testimonials as to their fitness for the ministry. Students who have passed the course are not now confined to the northern province, as was the original design, but are admitted in most of the southern dioceses. The average number of students on the boards is about 80, and the total number ordained, up to 1864, is about 1500. The *College Calendar* is published by Messrs Rivington, London.

SAINT CA'THERINE'S, a thriving town of Canada West, stands at the mouth of the Welland Canal, on the south shore of Lake Ontario, 34 miles south-south-east of Toronto. The canal supplies unlimited water-power, and the town contains a number of excellent mills. Iron-wares, cloth and pottery, are manufactured, and ship-building and a flourishing general trade are carried on. Pop. (1861) about 7000.

SAINT CROIX, an American river, called also the Passamaquoddy, which, flowing out of Grand Lake, on the eastern border of Maine, runs east-south-east 75 miles to Passamaquoddy Bay, and forms a portion of the boundary between the United States and New Brunswick.

SAINT DOMI'NGO. See Hayti.

SAINT DOMINGO BARK. See Caribbee Bark.

SAINTE-MARIE-AUX-MINES, a manufacturing town of France, in the dep. of Haut-Rhin, 14 miles north-west of Colmar. In former times, it owed its prosperity to the silver mines in the vicinity; these, however, are now exhausted. Dyeing, yarn-spinning, manufactures of cotton, paper, and cherry-brandy are now the principal branches of industry. Pop. (1862) 7920.

SAINTES, an old town of France, in the dep. of Charente-Inférieure, on the left bank of the Charente, 43 miles south-east of La Rochelle. In ancient times, this town, under the name of *Mediolanum*, was the capital of the Santones, from whom the subsequent province derived the name of Saintonge. It contains interesting Roman remains, as a triumphal arch, and the ruins of an amphitheatre, circus, &c. Pop. (1862) 8405.

SAINT GEORGE'S ENSIGN is the distinguishing flag of the British navy. It consists of a red cross on a white field, with a union-jack in the dexter chief corner, as shewn in fig. 2 of the article Flag. Under Flag Officer, it is implied that an admiral, vice-admiral, or rear-admiral may have his flag red, white, or blue, according to the squadron to which he belongs. By a regulation of 1864, this old custom was altered; the squadrons are abolished, and the white Saint George's ensign is the badge of all ships in the navy. The red and blue ensigns are now left to government vessels—not being ships of war—and merchant vessels respectively. The ensign is borne at the peak, or, in harbour, on a flagstaff at the stern; in boats, the latter is the only mode of flying it. A full-dress ensign is the largest flag used, being often but little smaller than the quarter-deck of the ship which hoists it.

SAINT-GERMAIN-EN-LAYE, a town of France, in the dep. of Seine-et-Oise, on an elevation on the left bank of the Seine, 14 miles by railway west-north-west of Paris. It contains three handsome squares, a parish church, with a monument erected by George IV. over the remains of James II., several learned and other societies, and some factories. Pop. (1862) 12,263.

S.-G. had its origin in a monastery built by King Robert in the beginning of the 11th c., on the summit of the hill which was surrounded by the forest of Lyda (*Laye*), and dedicated to St Germain. The town, as well as the royal château, which was built either during the reign of King Robert, or soon after, was sacked by the English in 1346, in 1419, and in 1438. At S. G. the marriage of Francis I. was celebrated, and this king rebuilt the château in 1547. From before the time of Philippe-Auguste, S. G. had been the residence of the French court during a portion of the year, but Louis XIV. transferred the court to Versailles, and from this time the fortunes of S.-G. declined. Later, the château of S.-G. was assigned by Louis XIV. as the residence of the dethroned James II. of England, and here in exile that monarch held his morose court, devoting almost the whole day to religious observances. The chateau is now used as barracks and for other purposes. The Forest of S.-G. comprises 10,873 English acres.

SAINT HE'LENS, a flourishing town of Lancashire, on a small affluent of the Mersey, 3½ miles north-east of Prescot by railway. It is a straggling, ill-built, but thriving town, with an extensive trade in coal, and containing plate-glass, copper, bottle, and other works. The town also contains potteries, breweries, tan-yards, iron and brass foundries, and chemical works. Pop. (1861) 18,396.

SAINT HE'LIERS, capital of Jersey (q. v.), the chief of the Channel Islands, is situated on the south shore of the island, and on the east side of St Aubin Bay, lat. 49° 11′ N., long. 2° 6′ W. It is defended by Elizabeth Castle, on a rocky island off the shore, approached by a causeway at low water; and by Fort Regent, on the south-east side of the town, built about 1806, on a scarped granite rock, at an enormous expense. The harbour is large, and the pier commodious, but steamers cannot enter at all times of the tide. At spring tides, the water rises 40 feet. Victoria College—a handsome edifice, built on an eminence, in 1851—the hospital, the theatre, and the churches, are the chief buildings. The area of the town has rapidly increased within recent years. An active trade is carried on with England, France, and India. Pop. 30,000, including a garrison of upwards of 500 men.

SAINT IGNA'TIUS' BEAN. See Nux Vomica and Strychnos.

SAINT-JEAN-D'ANGÉLY, a small town of France, dep. of Charente-Inférieure, 15 miles north-north-east of Saintes. Pop. (1861) 5546.

SAINT JOHN'S BREAD. See Carob.

SAINT JOHN'S WORT. See Hypericum.

SAINT JO'SEPH, a city of Missouri, U.S., on the left bank of the Missouri River, on the eastern border of Kansas, 566 miles west-north-west of St Louis. It is connected by railway with Hannibal, on the Mississippi, and is the chief dépôt for the emigrant and supply trains to the western settlements. It has a court-house, ten churches, a

convent, several large hotels, five newspapers, three of which are dailies, steam-mills, and factories, and a large trade with the interior of the continent. Pop. (1860) 8930.

SAINT JUST, Louis Antoine de, a notable figure in the first French Revolution, was born at Decize, in Nivernais, 25th August 1767, educated at Soissons by the Oratorians, and afterwards went to Rheims to study law, but soon returned to his native village, where he devoted himself exclusively to literature. When the revolution broke out, S. J. was transported with enthusiasm, and became one of its most ardent apostles. Probably no man in France was a more genuine fanatical believer in the brilliant delusions of the period. Spotless, even austere, in his morals, reserved in manner but eloquent in speech, and rigorously earnest in his convictions, he rapidly rose into consideration among the inhabitants of his native commune, who elected him lieutenant-colonel of the National Guard, sent to Paris in 1790 to assist at the Fête of the Federation. In 1791, appeared his *Esprit de la Revolution et de la Constitution de la France*, in which the various causes of the revolution are sketched in a calm, keen, precise sort of way; and in the following year he was chosen deputy to the convention by the electors of Aisne. S. J. entered Paris on the 18th of September, fifteen days after the frightful massacres, which Lamartine in his *Histoire des Girondins* with melodramatic inaccuracy represents him as ordering in conjunction with Robespierre! He voted for the death of the king, and in an oration full of stern but exaggerated republican sentiment, gave his 'reasons.' It was this speech that made him famous and influential. The Girondins tried to win him over, but in vain. In all the fierce debates of this period, S. J. took a leading part; but he also displayed a great capacity for administrative organisation, and on the 11th of February 1793, carried his project for the formation of a committee to superintend the war. After the fall of the Girondins in June (S. J. took no part in their overthrow, and never once spoke during the disastrous struggle between the two sections), the civil war broke out, and it is from this point that we date the exhibition of that intense and merciless republicanism which fitted him so well to be the associate of Robespierre. It is commonly thought that S. J.—perhaps because he was so young—was merely an instrument in the hands of Robespierre; but the known facts of his career lead to a very different conclusion, and some writers have not scrupled to make S. J. the real head of the extreme party who exercised government in France during the *Reign of Terror*. Almost all the energetic, or, as some would prefer to say, sanguinary, measures drawn up to repress the royalists and timid republicans at home, and to repel the forces of the allied monarchs on the frontier, were devised by him. On the 19th of February he was elected president of the convention. He drew up the terrible report which led to the arrestment and execution of Hebert, Danton, and their adherents. S. J. had no scruples in cutting off his opponents. The intensity of his convictions rendered him indifferent to deeds of cruelty, however appalling. When the political reaction set in, and the party of moderation had got the upper hand in the convention, Robespierre and S. J. were seized and imprisoned (27th July 1794), and ordered to be guillotined next day. S. J. suffered with sullen calmness—not a word escaping his lips. See Ern. Hamel's *Histoire de Saint Just* (Par. 1859).

SAINT LÔ, an old town of France, capital of the dep. of Manche, built on a rocky elevation on the right bank of the river Vire, 55 miles by railway south-east of Cherbourg. From the high central part, several streets, more or less steep, branch off in different directions. The town, which is said to owe its origin and its name to a St L[illegible], bishop of Coutance, who caused a church to be built here in the 6th c., was destroyed by the Normans in 888, and taken by the English in 1346, and again in 1417. Noteworthy are the beautiful churches of Sainte-Croix, founded in 805, and of Notre Dame, which dates from the 15th century. Flannels, druggets, and cotton fabrics, cutlery, and leather, are manufactured, and a considerable supply of horses for cavalry are here obtained. Pop. (1862) 8539.

SAINT LOUIS, a port of entry of Missouri, U.S., the chief city and commercial metropolis of the central Mississippi valley, stands on the right bank of the Mississippi, 20 miles below its confluence with the Missouri, and 170 miles above the mouth of the Ohio. It is regularly built upon the limestone bank of the river, on two terraces, rising 20 and 40 feet above high water, with wide and well-built streets running parallel to the river, crossed by others at right angles. The principal structures are a city hall, court house, custom house, arsenal, merchants' exchange, mercantile library, city hospital, marine hospital, university, cathedral, and several of the largest hotels in the world. There are 76 churches, of which 19 are Roman Catholic; 3 general hospitals, 10 orphan, and numerous other asylums, and 7 convents; the St Louis University, under charge of the Society of Jesus, with 18 professors; the Washington University, Academy of Sciences, German Institute, normal and high schools, 53 periodical publications, 11 daily papers, 9 German papers, an opera house, and 5 theatres. Five city railways have replaced the omnibusses, and the water supply is pumped from the Mississippi. Among the manufactories are flour and lumber mills, sugar refineries, lard and linseed-oil factories, provision packing-houses, manufactures of hemp, whisky, tobacco, and vast iron foundries and machine shops, which consume the ore supplied from Pilot Knob and the Iron Mountain. S. L. has a vast trade by steam-boats to the whole Mississippi valley, 68,000 tons being owned there, and extensive railway connections. It is also the chief centre of the American fur trade. There are 7 banks, and 24 insurance companies. The property valuation is 102,408,230 dollars. In 1764, S. L. was the dépôt of the Louisiana Indian trading company; in 1768, it was captured by a detachment of Spanish troops; in 1804, was ceded with the whole country west of the Mississippi to the United States; the first brick house was erected in 1813; in 1820, its population was 4590; in 1860, 151,780.

SAINT LUCIE BARK. See Caribbee Bark.

SAINT MALO, a fortified seaport of France, in the dep. of Ille-et-Vilaine, at the mouth of the river Rance. It stands on a small island less than three miles in circumference, called *Le Rocher d'Aaron*, which lies close off-shore, and is connected with it by a causeway, 650 feet long, called *Le Sillon*. The island is completely covered by the town; the streets are narrow, filthy, and ill-ventilated, and the houses are built to the height of five and six stories. The harbour is spacious and secure, but its entrance is narrow, and is thickly set with rocks and shallows. It is perfectly dry at ebb-tide, but the flood-tide rises here from 45 to 50 feet. Numerous strong forts, both on the mainland and on the small islands that stud the roads, protect the harbour and town. A floating

basin is at present (July 1865) in course of construction, but will not be finished for several years. Ship-building is the principal branch of industry. On the island of Grand-Bé, a short distance from the ramparts, is the tomb of Chateaubriand (q. v.). Many vessels are employed in the mackerel, cod, and whale-fisheries, and active commerce is carried on. S. M. communicates with Rennes (the capital of the dep.) by a railway opened in 1864. Pop. (1862) 9330.

SAINT MI'CHAEL'S, the largest and most important of the Azores (q. v.), and, with the exception of St Mary's, the most eastern island in the group. Area, 224 sq. m., or 143,000 acres; pop. about 81,000. The island is mountainous, and rises in its highest summit to 3560 feet. Of the whole acreage, 40,000 acres are arable, and about 5000 acres are pretty equally divided between orange gardens and vineyards. In 1863, the total value of the exports, the larger portion of which goes to Great Britain, was £136,397; and the total value of the imports, of which more than a third consisted of general merchandise from Great Britain, amounted to £145,770. The crop of oranges, which form the staple article of the commerce of this island, was a large one in 1863; 189,686 boxes, representing a value of £67,141, were exported, and all to Great Britain. Ponta Delgada (pop. upwards of 20,000) and Ribeira Grande (pop. about 12,000) are the principal towns.

SAINT MICHAEL'S MOUNT, a conical and isolated rock in Mount's Bay, Cornwall, 3 miles east of Penzance. It communicates with the shore by a causeway 400 yards long, which, however, is covered with water 8 hours out of the 12. The Mount is 195 feet high, is about one mile in circumference, and is crowned by an old and picturesque castle—now used as a manorial residence—surmounted by a tower, on one angle of which there is a projecting stone lantern, popularly called *St Michael's Chair.* At the base of the Mount is a fishing village, of about 80 houses. This hill is to the geologist one of the most curious of localities, and, indeed, it is said to have 'excited more geological controversy than any mountain of the world.' At a very early period, S. M. M. was the seat of a religious house, and the apparition of St Michael is said to have appeared on one of its craggy heights. At the Conquest, the monastery of St Michael was annexed to the abbey of St Michael in Normandy. It long remained in the possession of the monks, and afterwards became the residence of several families in turn, until it was sold in 1660 to its present proprietors, the *St Aubyns.*

SAINT MICHEL, MONT, an extraordinary rock in Cancale Bay, in the north-west of France, 7 miles south-west of Avranches. It is a solitary cone of granite, 5 miles in circumference at the base, and rising to the height of 400 feet. It rises sheer out of a level expanse of sand, and though its elevation is not great, its perfectly flat environment and its pointed crest render it a most striking feature in the landscape. It is crowned by a church and castle, under which are conventual buildings, with their lofty turrets and high walls, and lower down still are the houses of the small town, which seem to adhere to the steep rock like limpets. A good road leads from the shore to the wide sands which surround the mount, and which are covered with water at every tide, except at neap-tides. At low-water there is a dry and firm track, about a mile in length, across the sands; but on both sides of it are dangerous quicksands. In the 8th c. an abbey which replaced an ancient temple of Jupiter was founded on the summit of the rock. A church, and an almost impregnable fortress, were afterwards founded by the Normans. After the Revolution the main building was changed into a prison. The castle was being restored in 1864.

SAINT NAZAIRE, a thriving seaport of France, in the dep. of Loire-Inférieure, at the mouth of the Loire, on the north bank of that river, and 38 miles west of Nantes, with which it is connected by railway. Almost unknown till within recent years, it is now one of the most important ports on the west coast of France. In 1851, it contained 2391, in 1861, 6500, and in 1865, it is stated to contain 15,000 inhabitants. In addition to the old basin, the French government are now (1865) constructing another for the accommodation of the large Trans-atlantic steamers which leave this port for the Antilles, Cuba, and Mexico. One cause of the rapid rise of this port is, that the navigation of the Loire is becoming year by year more difficult, owing to the sand brought down by the river; so that the chief shipowners of Nantes prefer to leave their vessels at S. N., and have the cargoes transported inland by railway.

SAINT NE'OT'S, a small market town in the county of Huntingdon, 8 miles south-south-west of the town of that name, occupies low ground on the banks of the Ouse, by which it is sometimes partially inundated. Its parish church, with a tower 156 feet high, is a remarkably beautiful building. Pop. (1861) 3090.

SAINT NI'CHOLAS, a flourishing manufacturing and market town of Belgium, in East Flanders, 20 miles east-north-east of Ghent, on the Ghent and Antwerp Railway. It stands in the midst of the Pays de Waes, a densely peopled and productive agricultural district, and is said to be the seat of the largest flax-market in the world. The market is held in the great square of the town, one of the largest in Belgium, but which, however, is too small to accommodate comfortably the immense numbers who crowd hither on market-days. S. N. is a manufacturing town of the first class; and among the articles largely manufactured are cotton, woollen and silk stuffs, carpets, hats, lace, tobacco, and pipes. There are print-fields, dyeworks, and tanneries, and a flourishing trade is carried on in shawls, linens, and other manufactured goods, as well as in flax, corn, hops, &c. Pop. 21,800.

SAINT OMER, a town of France, and fortress of the third rank, in the department of Pas-de-Calais, on the Aa, 26 miles south-east of Calais by railway. It is surrounded by irregular but well-appointed fortifications, is well built amid marshes, and contains numerous fountains and more than one important ecclesiastical edifice. Woollen cloths, blankets, pottery, and clay pipes are manufactured, and there is considerable general trade. Pop. (1862) 19,696. A college for the education of English and Irish Catholics was opened at S. O. during the penal times. It was closed, however, during the Revolution, and the community was afterwards transferred to England.

SAINT PA'NCRAS, one of the northern suburbs of London (q. v.).

SAINT PAUL, a city, port of entry, and capital of Minnesota, U.S., is on the east bank of the Mississippi River, 2080 miles from its mouth, and 9 miles below the Falls of St Anthony; lat. 44° 52′ 46″ N., long. 93° 5′ W. It is built upon a plain 80 feet above the river, and 800 feet above the Gulf of Mexico. Hills near the city abound with springs of excellent water. S. P. is at the head of navigation for the large steamboats of the Lower Mississippi and its branches, and the centre of a large

and growing trade in flour, lumber, furs, &c. It has a state-house, cathedral, college, 14 churches, as many hotels, a daily newspaper, and educational and charitable institutions. In 1846, there were 10 white inhabitants. Pop. in 1860, 10,277.

SAINT PAUL DE LOA'NDA, a considerable seaport on the south-west coast of Africa, the principal Portuguese settlement in Lower Guinea, stands at the mouth of the river Bengo, in lat. about 8° 54′ S. It is the largest and most important European settlement on this coast, and contains 12,000 inhabitants, of whom 830 are white, 2400 mixed, and 9000 black. The climate is comparatively healthy, the harbour is beautiful, and protected by one large and two small forts. The houses are good, the streets unpaved, and there are three churches and three market-places. Abundance of fruit and vegetables, bullocks, and goats are obtainable in the markets. Ivory and bees-wax are the principal exports.

SAINT PE'TERSBURG, a maritime government of Russia, one of the Baltic Provinces, between Lake Ladoga on the north-east and Lake Peipus on the south-west. Area 24,060 sq. m.; pop. 1,083,091. The soil is damp and thin, and woods and marshes cover two-thirds of the level surface. In the vicinity of the capital, much ground is laid out in market-gardens. The usual crops are grown, but the quantity of corn produced is greatly less than the quantity consumed. The chief town is the capital, *Saint Petersburg* (q. v.).

SAINT PETERSBURG, the capital of the Russian empire, and of the government of the same name, stands upon, and around the lower branches of, the Neva, and on the shores of the eastern extremity of the Gulf of Finland, 16 miles east of Cronstadt, its port. Lat. 59° 56′ N., long. 30° 19′ E. The Great Neva, the most southern branch of the Neva, divides the city into two great sections—the Petersburg Side on the north, and the Great Side on the south. The former is built on the islands which are formed by the delta of the Neva, the chief of which are the Vassili Ostrov, the Citadel Island, and the islands Aptekarskoi, Kammennoi, Petrovskoi, Krestovskoi, and Elaghinskoi. The Great Side, south of the Great Neva, is compactly built, and contains the residences of the court and of the nobility, and more than half the population. The city covers an area of 42 sq. m., stands 56 feet above the level of the sea, upon plains which were formerly malarious marshes, but are now for the most part drained and laid out in meadows and gardens. Pop. 520,131.

The climate, severe in winter, is as pleasant and mild as that of Scotland in summer. The mean temperature in summer is 62°; in winter, 14° F. The extremes of temperature are 99° and −51°. Fourteen arms of the Neva, irrespective of the smaller branches, ramify through S. P., and there are seven canals.

General View of Saint Petersburg.—Approaching the city from Cronstadt (q. v.), the port and fortress of the Russian capital, the first indications of the great city are the gilded dome of the church of St Izak, and the lofty spire of the Admiralty, which are seen rising apparently from the water's edge. The Admiralty Square, faces the English Quay on the south bank of the Great Neva, and may be considered the centre of the city. From the spire, with its numerous galleries, the whole plan of the city can be clearly seen. Right opposite it is the populous Vassili Ostrov, on the south shore of which are the Bourse, Academy of Sciences, Corps of Cadets, &c. To the north is the Citadel Island, and further north the densely-peopled Aptekars Island, and the Kammennoi, and other islan[ds] which are for the most part studded with wo[od-]embosomed villas, and laid out in charming garden[s]. Considering the river on the north as the chor[d] and the Admiralty as the centre, the semicircle th[at] might be drawn with a radius of 2¼ miles, wou[ld] pretty nearly describe what is called the Grea[t] Side of Saint Petersburg. This section of the cit[y] is divided into three or four portions by the Moika, St Catharina, Fontanka, and New Canals; and it is intersected by three spacious streets, which radiate east-south-east, south-east and south from the great centre, the Admiralty. The streets are named respectively the Nevski Prospekt (Neva Perspective), Gorokhovaia Oulitza (Peas Street), Vosnosenskoi Prospekt (Resurrection Perspective). Extensive suburbs also are rising on the eastern bank of the Neva, seven miles above its mouth.

Streets, Squares, Monuments, Bridges, Churches, &c. —The street architecture of S. P., unlike that of Moscow, with its pale-yellow walls and red and green roofs, is almost destitute of colour. Here the rigid, military aspect of the streets, with the houses drawn up in long regular lines of gray, or massed together in blocks like the squares of battalions, is one of the first features of the Russian capital that impress themselves upon a traveller. Except in the more fashionable quarters, the greater number of the houses are built of wood; but owing to the liability of such houses to catch fire, building in this material is very much discouraged. S. P. contains 500 streets, and among these, lanes and alleys are unknown, as, while the finest streets have a breadth of 120 feet, the narrowest are 42 feet broad. The Nevski Prospekt is the most splendid street in S. P.; and for architectural grandeur, as well as for natural beauty, for proportions, and for variety, is considered the finest street in Europe. It is 130 feet broad, and about 4 miles long, is planted on both sides with trees, contains a large number of the most beautiful palaces, of highly ornamented churches, and splendid warehouses, and increases in breadth and magnificence as it advances from the Admiralty. For the first mile, it does not contain more than about 50 mansions, each of which, however, is of colossal magnitude. The houses are built of brick faced with stucco, are three and four stories high, and are in many cases furnished with ornamental porches, colonnades, gilded balconies, and parapets that gird the flat roofs. About ten of the other streets of the city are distinguished for their grandeur, though none of them equals the Nevski Prospekt. There are 64 squares in the city, and of these the Admiralty Square is one of the most famous. It contains one mass of buildings, presenting to the Neva a fine façade, nearly half a mile in length, while its sides are 650 feet long. In the Palace Square, adjoining the Admiralty, stands Alexander's Column, an immense monolith, erected in 1834. It consists of a shaft of red granite, standing on a pedestal of the same material, and supporting a capital, above which rises the figure of an angel and a cross. The length of the shaft is 80 feet, and that of the whole column 150 feet. Peter's Square contains the noble and well-known equestrian statue of Peter the Great, 18 feet high, and erected 1768—1782. The Field of Mars, with an area large enough to allow of 40,000 men being put through military evolutions, contains the colossal bronze statue of the famous Suwaroff.—*Bridges.*—Of the 150 bridges that unite the islands, cross the canals, and span the Neva, the Annitchkoff Bridge, leading across the Fontanka Canal, consists of five arches, is 110 feet long, and is decorated with four spirited groups, in

bronze, of wild horses and their tamers, by a native artist. The Nikolayevski Bridge, a magnificent structure in granite, and the only permanent bridge that crosses the Neva—the others being merely temporary bridges supported on boats, and removed every autumn and spring—was completed in 1850. It crosses the Neva from the English quay on the south bank to the Vassili Ostrov shore, is 1200 feet long, and consists of 7 elegant arches, supported upon ponderous piers of granite. At the northern end of the bridge, there is a drawbridge which affords a passage to ships. No part of S. P. affords a foundation solid enough to support weighty structures. The foundation for the Nikolayevski Bridge was not obtained until three sets of piles had been driven into the oozy bed of the river, the one on the top of the other, and so close, that all the timbers touched each other all the way across.—*Palaces, &c.*—S. P. might be called a city of palaces, from the number of the edifices of that description which it contains. The Winter Palace, destroyed by fire in 1837, but soon after rebuilt, is certainly the largest, and, in one sense, most probably the most magnificent palace in the world. It is 700 feet long on every side, has an imposing façade, and contains 800 inhabitants, and, during the residence of the emperor within it, is inhabited by 6000 people. It has numerous ample halls, decorated in the most artistic manner, and containing collections, furniture, and articles of *vertu* of immense value. The Hermitage, situated on the Neva like the Winter Palace, is connected with that structure by several galleries. Its gallery of 2000 paintings is famous for its specimens of the Spanish school. The library of this palace contains the collections of Diderot, Voltaire, &c., and contains in all 120,000 vols. The Annitchkoff Palace is the usual residence of the emperor. The Imperial Library, one of the first in Europe, contains 450,000 volumes and 25,000 MSS. The gilded tower of the Admiralty buildings, which is said to be visible from Cronstadt, and certainly forms in these flats a most conspicuous landmark, is 230 feet high. The Old and New Arsenals are surrounded by cannon taken from the Turks and Persians.—*Churches.*—S. P. contains 177 churches, besides 140 private chapels (*hauskapellen*). Within the Citadel stands the church of St Peter and St Paul, finished in 1727. It is surmounted with a slender tower, crowned by a gilded spire, the whole being 345 feet high. The cathedral of St Izak, though destitute of architectural beauty, is remarkable for its rude magnificence, and is one of the most considerable buildings of modern times, is 330 feet long, 290 feet broad, and 310 feet high. It is surmounted by a great gilded dome, and by four smaller domes. The domes are made of bronze, and the value of the plate-gold by which they are overlaid is stated at £50,000. Each of its four sides is adorned with a peristyle of 12 or 16 pillars, each consisting of one block of red Finland granite. These pillars are 53 feet high, and are seven feet in diameter at the base.

Academies, Scientific Institutions, &c.—The Academy of Sciences, with a library of 100,000 volumes, was founded by Peter the Great in 1725. In the Institute of Technology, founded in 1829, 200 pupils are taught silk-spinning, the manufacture of cloth, silk, and woollen stuffs, wood-cutting, and engraving on copper. The University, founded in 1829, is attended by 500 students, and has a staff of 60 professors. The New National Museum of Antiquities, Painting, and Sculpture, completed in 1851, is a noble structure, built entirely of marble and metal. Other institutions, as the School of Mines, the Gostinoi Dvor or Bazaar, are worthy of mention. There are numerous benevolent institutions, a number of splendid theatres, and an Italian opera, a magnificent structure.

Manufactures.—Of the manufacturing cities of Russia, S. P. is one of the most important. The principal private factories are mills for spinning and weaving cotton. The immense imperial establishments produce the most admired specimens of Gobelin tapestry, mirrors, articles in bronze, playing-cards, crystal, and porcelain.

S. P. is little more than a century and a half old, and yet it takes rank among the first capitals in the world. It was founded by Peter the Great, May 27, 1703. After a long struggle against the severe climate, insalubrious from the exhalations of wide-extended marshes, and from the arctic rigour which even yet can cover the Neva with ice a yard and a half thick, at length the town was founded and declared the capital in 1712. Under the successors of Peter, the improvement, embellishment, and extension of the city were carried on. Catharine II. constructed the great canals which, while they afford means of ready communication, serve also to drain the marshlands, to render the atmosphere more healthy, and to mitigate the rigours of winter. The city suffered great damage and the loss of several hundred lives in 1824 from an inundation of the Neva; and every April, when the ice breaks up, the lower regions of the city are threatened with a similar disaster. At S. P., all the ministers from foreign courts are bound to reside.

SAINT PETER'S LE PORT, or commonly *St Peter's*, the chief town of Guernsey, one of the Channel Islands. See GUERNSEY.

SAINT PIERRE, the chief town, though not the seat of government, of the island of Martinique (q. v.), belonging to France, stands at the head of a bay, 16 miles north-west of the capital, Fort Royal. It is said to be the largest town in the Antilles, containing, according to the most recent authorities, 25,000 inhabitants.

SAINTS, a name applied in the New Testament to the members of the Christian community generally, but restricted by ecclesiastical usage from very early times to those who, whether under the old or under the new dispensation, have been specially remarkable for their personal virtues and their eminent services to the cause of religion. Of the old dispensation, the 'patriarchs and prophets' are commonly designated as saints. But the word is used much more of the Christian Church. In the ages of persecution, the quality which most of all challenged the admiration and reverence of the faithful was naturally courage and constancy in the profession and the defence of the Christian faith; and thus the earliest of those whom the church reverences for sanctity of life, are also, for the most part, reverenced as champions of the faith. In general, however, the saints are distributed into several classes, chiefly in relation to the special services which the church has appropriated to their honour. Thus we find enumerated (1.) Apostles and Evangelists; (2.) Martyrs; (3.) Confessors, a name applied primitively to those who had exhibited great constancy in professing the faith, although without the final crown of martyrdom, but in later times understood of all who, without being martyrs, were eminent for sanctity of life; (4.) Doctors or men eminent for sacred learning; (5.) Virgins; (6.) Matrons and Widows, distinguished for holiness of life. Anciently the character and appellation of saint was bestowed upon individuals, as it were, by acclamation, and by the common voice of the members of the particular Christian community to which the individual belonged, or to which his merits were most familiar. The earliest

that thus, as may be seen in the letter of the beneficii of Smyrna on the martyrdom of Polycarp, ciansuch judgments as to individuals were in the cause of the martyrs. Altars were erected at their tombs, and the people assembled for worship on the anniversary of their martyrdom. Even then, however, the letters of St Cyprian (Epp. 37 and 39) shew that caution was observed by the bishops to guard against the recognition of undeserving individuals. The honours of the martyrs, even before the age of persecution had passed, were extended to confessors of the faith, and eventually to all who were eminent for holiness of life, and especially to those who obtained the reputation of performing miracles. The names of those who were so honoured were placed in the register (or diptych) of each church. It was not, however, till a comparatively late period that a regular form of procedure was established in the Roman Church for the purpose of testing the claim of individuals to the authentic reputation of sanctity. From the 4th c. downwards, examples of reference to Rome—as, for instance, in the Acts of Virgilius, Bishop of Trent—are cited by Catholic writers. But the first recorded example of a solemn and public decree is in the case of Udulric or Ulric, Bishop of Augsburg, to whom the honours of sanctity were adjudged by Pope John XVI. (see Hardouin, Concil. VI. P. I., p. 727) in the end of the 10th c. (993). Since that time the procedure of the Church of Rome as to the public recognition of the saints has been matured and methodised. It consists of two stages, that are called respectively 'Beatification' and 'Canonisation.' The former is but a preliminary process, and consists in a declaration by the pope that the 'beatified' person is entitled, by reason of his (or her) eminent virtues, attested by miracles, to be regarded as a saint, and as such honoured and invoked. This authorisation, however, is not in beatification extended to the entire church, but is always limited to a particular church, or province, or religious order; and the nature of the honours permitted to be paid to the beatified person is strictly defined either by the terms of the decree, or by local usage, if such have already existed. But although the effect of a decree of beatification is less comprehensive than that of the subsequent and final declaration in canonisation, the preparatory inquiry is in all substantial particulars the same. The details of both are explained at great length and with curious minuteness by the learned Pope Benedict XIV. (Lambruschini) in a special work on the subject, which has the further interest of containing as an appendix the minutes of the entire proceedings in the canonisation which took place during his own official connection with that department. The inquiry in both procedures is conducted by the congregation of cardinals, called the Congregation of Rites, and consists first in an examination of the writings (if there be any) of the individual, then of the holiness of his life and conversation, and finally of the miracles alleged to have been performed by him in life, or obtained through his relics and intercession after death. Two such miracles at least must be established by what is considered satisfactory evidence. Upon all these points sworn depositions are required, and all are subjected to a most rigorous scrutiny, in which the office of impugnant is discharged by an advocate called Promotor Fidei, and popularly nicknamed the Devil's Advocate, his duty being to raise every possible difficulty in the way of the acceptance of the evidence of sanctity. This inquiry is generally a very protracted one; and after it has been completed, and its results recorded in writing, the acts are submitted to the cardinals, who meet three times in private congregations, and finally, if all appears satisfactorily established, in a public congregation, by which the decision is made known to the pope. Should the decision be approved by the pope, the solemnisation is proceeded with. The solemnity takes place in the Vatican Church. The cardinal prefect of the congregation of rites hands the pope's brief to the cardinal, arch-priest of the Vatican, by whom it is read; the *Te Deum* is intoned; the image of the beatified individual is uncovered, to receive the veneration of the assembly; high mass, with the Collect in his honour, is sung; and in the afternoon the pope goes solemnly to the church to pay reverence to the image. The procedure, in case of a martyr, is somewhat different. In both, however, the process is but preliminary to the solemn canonisation. The effect of the latter comprises (1.) a declaration that the canonised person is to be recognised as a saint throughout the entire church; (2.) that he is to be invoked in the public prayers; (3.) that churches and altars may be erected in his honour; (4.) that he may be invoked in the mass and public service; (5.) that a festival may be celebrated in honour of him; (6.) that his image may be set up in public; and lastly, that his relics may be preserved and publicly honoured. The solemnity of canonisation, which is preceded by a new inquiry similar to that of the beatification, and a new judgment of the congregation of rites confirmed by the pope, is one of the most gorgeous in the entire ceremonial of the Roman Church. It takes place in the Vatican Church (St Peter's), and is generally attended by a large assembly of bishops from various parts of the church. In many respects it resembles that of the beatification, but its distinctive characteristic is the solemn publication, by order of the pope in person, after the hymn of invocation of the Holy Ghost has been sung, of the decree of canonisation. This is followed by mass, also celebrated by the pope in person, and sometimes by a homily of the pope in honour of the newly canonised. The Church of St Peter's is specially decorated at a vast cost for the ceremonial, and the entire expenditure on such occasions has been estimated at not less than £20,000. Roman Catholics hold that in such decrees the judgment of their church is infallible; and to deny that any particular canonised individual is really a saint, is held to involve, if not actual heresy, at least a grievous act of contumacy against the faith of the church. On the doctrine of saint worship, see INVOCATION OF SAINTS; and on that regarding the honour paid to relics of saints and martyrs, see RELICS.

SAINTS' DAYS, days set apart in honour of particular saints and martyrs. The practice dates from the times of persecution, when the people were wont to assemble at the tombs of martyrs on the anniversary of the martyrdom. In the multiplication of such celebrations, a record of the days fixed for each saint or martyr became necessary. This was called *calendarium*. The days so appointed were celebrated with more or less solemnity, according to the dignity of the saint, or the degree of devotion with which he was regarded. In some cases the saint's day was kept as a holiday of obligation, in which no servile work was permitted to be done. Other days are of various minor degrees of solemnity, and are called double (greater or lesser), semi-double, and simple, from the peculiar form of the office set apart for each. In particular countries, provinces, dioceses, or parishes, the day of the patron saint is specially celebrated; and in all churches the festival of the saint to whom the church is dedicated.

SAINT SERVAN, a seaport of France, in the

dep. of Ille-et-Vilaine, stands at the mouth of the Rance, opposite St Malo (q. v.), to which there is communication by land at low-water. The harbour, called Port Solidor, is secure. S. S., which is frequently spoken of as a suburb of St Malo, is much frequented as a watering-place, and carries on ship-building and considerable commerce, especially in timber. Pop. (1862) 9288.

SAINT SIMON, LOUIS DE ROUVROI, DUC DE, whose family claimed to be descended from Charlemagne, was born in January 1675. After receiving a careful education under the superintendence of his mother, he entered the army in 1693, but considering his promotion not equal to his deserts, he resigned his commission in 1702, and devoted the remainder of his life to a sort of court statesmanship. S.'s position was as singular and as anomalous as his character. Profoundly ambitious, his pride was yet greater than his ambition. His ideas of aristocratic rights and privileges were perhaps more outrageously fanatical than any ever entertained in modern ages: and the whole aim of his life was to nullify the influence of the parliament, and to place the government of France in the hands of the *grands seigneurs*—the great territorial lords. The middle class he abhorred; and the rise to distinction of any one belonging to that order--any *novus homo*, tortured his patrician soul almost beyond endurance. We have not space (nor would it be worth our while, if we had) to recount his career of haughty and insolent conspiracy against the political rights of commoners, which marks him out as the most thoroughgoing oligarch in principle of whom we have any record. During the latter part of Louis XIV.'s reign, and the regency of the Duke of Orleans, he enjoyed much consideration, and his aristocratic policy more than once enjoyed a temporary triumph; but with the accession to the regency of the Duke of Bourbon he fell into disgrace, and withdrew from public life. He died at Paris, 2d March 1755. S.'s last years were occupied chiefly in the composition of his famous *Memoires*, a work of incalculable historical value. Though the style is far from faultless, it so admirably expresses the meaning of the author, that one would not wish it other than it is. The *Œuvres Complètes de Louis de Saint Simon* appeared at Strasburg in 1791, in 13 vols., but the best edition is that of M. Cheruel (20 vols. Paris, 1856, et seq.). See A. Lefèvre Pontalis, *Discours sur la Vie et les Œuvres de Saint Simon* (Paris, 1855).

SAINT SIMON and SAINT SIMONIANISM. CLAUDE HENRI, COMTE DE SAINT SIMON, a French social philosopher, founder of the sect named after him, *Saint Simonians*, belonged to a different branch of the same family as the preceding, and was born at Paris, 17th October 1760. Although destined to become the propagator of the most revolutionary and democratic ideas of modern times, he was reared in a perfect hotbed of aristocratic prejudice. Nevertheless, from his earliest years, S. exhibited a decided hostility to the established system of things, mainly, however, it would seem (according to the anecdotes in vogue) from a certain puerile vehemence and obstinacy of nature. He was cursed, moreover, with a precocious vanity. What are we to think of a lad scarcely 16 giving his servant orders to rouse him every morning with such a flattering summons as *Levez-vous, Monsieur le Comte, vous avez de grandes choses à faire*, especially when, in point of fact, he had *nothing* to do? S. was pretty well educated in philosophy, like most of the young nobles of his time, and had D'Alembert among others for his tutor. At 18 he entered the army, served in America, and distinguished himself on the day when Lord Cornwallis surrendered at York (17th September 1781) all his forces. Captured by the British on his return home, he was taken to Jamaica, where he remained till the peace in 1783 restored him to liberty and France. But the monotony of garrison life did not suit his restless and impatient spirit, and in 1785 he quitted the service, and travelled in Holland and Spain, busying himself with various industrial schemes, such as connecting Madrid with the sea by means of a canal, and introducing *diligences* into Andalusia—the latter of which proved successful. The great revolution found in him—noble though he was—an enthusiastic disciple, and he voted in his patrimonial canton for the abolition of titles of nobility, but did not take any part in the political events that followed. His energies were devoted to matters more profitable than patriotic—viz., the purchase of confiscated property—and it is unhappily not at all doubtful that when France was labouring in the agony of a mighty struggle after new life, S. was consumed by an ignoble passion for enriching himself. But then, as his disciples have naïvely observed, it was necessary that he should acquire a fortune in order that he might be able to devote himself satisfactorily to ideas. It was during the revolution, and while suffering a temporary imprisonment in the Luxembourg, that visions of a new social system, based on scientific principles, and not on political conventionalities, first unfolded themselves before his ardent imagination. His ancestor Charlemagne appeared to him one night in a dream, and said: *Depuis que le monde existe aucune famille n'a joui de l'honneur de produire un héros et un philosophe de première ligne. Cet honneur était réservé à ma maison. Mon fils, tes succès comme philosophe égaleront ceux qu' J'ai obtenus comme militaire et comme politique.* S., though now 38 years of age, commenced to study 'science,' of which he was as yet quite ignorant. The plan he adopted was pleasant and ingenious. He took a house opposite the *Ecole Polytechnique*, and invited to his table the professors of mathematics, of physics, and of astronomy, from whose lips—in the intervals of their feeding--he acquired the necessary information. Then he changed his lodgings, and fixed himself near the *Ecole de Medicine*, where, pursuing the same method with the physiologists, he learned from them something of the structure of organised bodies. In 1801, he married, and threw open his *salons* to all the savans and artists of Paris; but his lavish hospitalities--prodigalities, perhaps, they ought rather to be called—soon dissipated the fortune he had amassed during the revolution. Meanwhile a notable social idea seized him. Hearing that the husband of Madame de Stael had just died, he resolved to marry the widow, whom he considered to be the only woman fit to associate with him in his great project for the regeneration of society. To be sure there was a little impediment in the way—viz., his being already married; but in France there is never any difficulty in getting a divorce; and S. was soon as good as a bachelor again. Betaking himself to Coppet, he unfolded his plan to the lady, and begged her concurrence, urging his suit (it is said) by the most impressive considerations: *Madame, vous êtes la femme la plus extraordinaire du monde; comme j'en suis l'homme le plus extraordinaire; à nous deux nous aurions, sans doute un enfant plus extraordinaire encore.* Madame de Stael, however, declined to further the philanthropic projects of S. in the way he wanted, and the reformer—now beginning to be in straits—published at Geneva a *Lettre d'un Habitant de Genève a ses Contemporains* (1803), in which he proposes (among other things)

that there should be an annual subscription for the benefit of men of genius—mathematicians, physicians, chemists, physiologists, litterateurs, painters, and musicians—that spiritual power should be in the hands, not of the clergy, but of savans, and temporal power in the hands of the landed proprietors, while the privilege of choosing 'chiefs of humanity' should belong to everybody; finally, he asserts that religion is only a human invention. S.'s proposal (so obstinately prejudiced are men against what is right) was not adopted—was not even noticed, either by 'men of genius' or others, and in the course of a few months he was glad to accept the office of copyist at the Mont-de-Piété. Even this humble means of making a livelihood he had to resign from ill-health, and he would probably have died of starvation had he not fallen in by chance with an old revolutionary friend called Diard, who took him into his house and furnished him with means to publish one of his most important works, the *Introduction aux Travaux Scientifiques du Dix-neuvième Siècle* (Par. 1807). The death of Diard, in 1810, once more plunged S. into misery. Soon after, we find him writing to Lacépède, Cuvier, Degérando, Cambacérès, &c., in this style: '*Monsieur,' soyez mon Sauveur, je meurs de faim . . . . Depuis quinze jours, je mange du pain et je bois de l'eau; je travaille sans feu et j'ai vendu jusqu'à mes habits pour fournir aux frais des copies de mon travail.* There is nothing ludicrous here—it is the plain unaffected agony of utter want. In 1812, his wretchedness came to a crisis; he left Paris, betook himself to Peronne, where he fell dangerously ill, but recovered through the attentions of his family, who now settled a small pension on him; he then returned to Paris. After the Restoration, he began—in spite of his extravagant vanity—to reap the never-failing reward of enthusiasm and perseverance—a crop of disciples. Of these the most distinguished was Augustin Thierry, who assisted him in the redaction of his *Réorganisation de la Société Européenne*—a work intended to demonstrate the inutility of the Congress of Vienna, and the incapacity of all mere political congresses to establish a durable peace. He proposes the institution of a European parliament, having the right to arbitrate in cases of difference among the various nations, and adds that the first step towards the reorganisation of Europe is the union of France and England. In 1817—1818, he published *L'Industrie, ou Discussions Politiques, Morales, et Philosophiques*, partly written by himself and partly by his disciples. The third volume is the work of the celebrated Auguste Comte (q. v.). By this and other literary enterprises S. had exhausted all his funds, and as he saw no prospect of getting any more, he resolved to commit suicide, and actually discharged a loaded pistol at his own head (9th March 1823), which, however, only deprived him of an eye, and not of life. The last, and by far the most remarkable work of S., is his *Nouveau Christianisme* (Par. 1825), which contains his final and matured convictions. According to him, Christianity has been diverted from its original design. Progressive by nature, and meant to be modified by the changing circumstances of times and countries, it has been stiffened into unalterable dogmas by ecclesiastical conclaves. The clergy, whose mission is to instruct, are ignorant of the thoughts and manners of modern times, and have exhibited a complete and deplorable incapacity. Protestantism is no wiser than Catholicism. It has set its face against the fine arts, and has shewn a cruel and fatal indifference to the physical amelioration of the poor. But genuine Christianity embraces in its consideration all the needs of humanity. From its grand principle, 'Love one another,' it derives the proposition, that 'religion ought to direct all the social forces towards the moral and physical amelioration of the class which is at once the most numerous and the most poor.' From this premiss is deduced the idea of a social hierarchy based on capacity and labour—the new spiritual church comprising all functions and professions, sanctifying science and industry, regulating vocations, fixing salaries, dividing heritages, and taking the best measures to make the labours of each conduce to the good of all. S. did not live to carry out his principles in detail as far as they would have logically carried him, dying on the 19th May 1825; but in the writings of Comte we find the legitimate terminus and result of his sweeping speculations. Much in the character and system of S. is unquestionably false, exaggerated, and even laughable, but the man who reckoned among his disciples names like MM. Augustin Thierry, Auguste Comte, Olinde Rodrigues, Bailly (de Blois), Léon Halévy, Duvergier, Bazard, Enfantin, Cerclet, [illegible]et, Carnot, Michel Chevalier, Henri Fournel, Dugied, Barrault, Charles Duveyrier, Talabot, Pierre Leroux, Jean Reynaud, Emile Péreire, Félicien David, Saint Cheron, Guéroult, Charton, Cazeaux, Duhochet, and Stéphane Mony—is one whom posterity will not willingly forget.

SAINT THO'MAS, one of the Danish West Indian Islands, forms one of the group of the Virgin Islands (q. v.), and lies 38 miles east of Puerto Rico. Area (official statement), 25 sq. m.; pop., 13,000. The surface is hilly and the soil poor. Water is exceedingly scarce; the chief town of the island, Charlotte Amalie (q. v.), being dependent for its supply upon tanks of collected rain-water. The cultivation of vegetables, grass, and a small quantity of cotton, employs the scanty rural population; but the products are small, and nothing is exported. In 1863, 751 British vessels, including schooners and sloops, and carrying 95,819 tons, arrived at the island. The value of manufactured and other goods imported from Great Britain in 1863 was £841,200. The port, Charlotte Amalie or St Thomas, is a station for steam-packets from Southampton to the West Indies, and is an important entrepôt of West Indian produce.

SAINT THOMAS, an island off the west coast of Africa in the Gulf of Guinea, belonging to Portugal, 260 miles south-west of Fernando Po. Area about 120 sq. miles. Of its inhabitants, 1000 are white and mulattoes, 2000 are free blacks, and about 10,000 are slaves. Sugar was formerly grown extensively; coffee is now the chief article of export. The chief town is St Thomas or Chaves, a bishop's see, with about 4000 inhabitants, who live in miserable wooden huts, and few of whom can write or even read.

SAINT VI'NCENT, one of the British islands in the West Indies, 100 miles west of Barbadoes, at the mouth of the Orinoco. Area, 131 sq. m.; pop. (1861) 31,755, of whom 2347 were white, 6553 coloured, and 22,855 black. The island is one of the most beautiful of the group to which it belongs. It is traversed from north to south by a chain of volcanic mountains, which rise in the volcano called the Souffriere to the height of 3000 feet. Many of the valleys are fertile, and the shores are rich and productive. About 2-5ths of the entire area, or 35,000 acres of the 84,000, are under cultivation. Much rain falls, often to the serious injury of the crops and of the roads, but the climate is nevertheless healthy. In 1860, the island contained only 31 schools, attended by 2189 scholars, and the standard of the morality, as well as of the

culture of the inhabitants, was low. In the same year the revenue amounted to £20,231, and the imports to £150,343. The exports, chiefly sugar, arrow-root, and rum, amounted to £172,265. In the same year 702 vessels, of 39,296 tons, entered and cleared the ports, the chief of which, and the capital of the island, is Kingston (q. v.).

SAINT VINCENT, CAPE, in Portuguese *Cabo da São Vicente*, a promontory forming the south-western corner of Portugal and of Europe, off which several important naval battles have taken place. On June 16, 1693, Admiral Rooke, with 20 English men-of-war, was here attacked by a vastly superior French fleet, and defeated with the loss of 12 men-of-war, and 80 merchantmen which were sailing under his convoy; on January 16, 1780, Admiral Rodney here destroyed several Spanish ships; on February 14, 1797, the great battle of Cape St V., between 15 British line-of-battle and 6 frigates, under Admiral Jervis (afterwards created Earl St Vincent), and 27 Spanish line-of-battle and 12 frigates, resulted in the total defeat of the latter and capture of 6 of their largest ships (of which, however, 4 only were ultimately secured). The effect of this last victory was to frustrate the formidable Spanish-French scheme of invading England. The fourth naval fight off Cape St V. took place between the fleet of Queen Maria of Portugal, commanded by Sir Charles Napier (q. v.), and that of Dom Miguel, in which a portion of the latter was destroyed, and the rest captured, 5th July 1833.

SAINT VITUS DANCE. See CHOREA.

SAIS, an ancient Egyptian city, called in the hieroglyphs *Sa*, and existing at the time of the old monarchy, was situated on the right bank of the Canopic branch of the Nile, in 31° 4' N. lat. It is at present called Sa el Hagar, or Sa of the Stone, from some modern stone buildings in the neighbourhood. There are, however, no remains of temples or palaces on the site; all that remains being a wall of unburnt brick 70 feet in thickness, perhaps the peribolos of the temple. Traces of the Temenos, 720 feet long, still exist, and of the citadel, but the temples and tombs which stood within the city walls have been completely stripped; many fine statues of basalt of the 26th or Saite dynasty, from this spot, being found in the different collections of Europe. S. gave its name to a nome, and also to two Egyptian dynasties, the 24th and 26th, founded by natives of the city. The goddesses principally worshipped there were Neith or Minerva, and Ceres or Isis. Neith was said to be the mother of the sun, and is constantly called in the hieroglyphical legends the mistress of S.; and an inscription in the temple of Neith is said to have declared of her, 'I am past, present, and future, no one has lifted my veil, the fruit I have brought forth is the sun.' At S. there was also a sepulchre of Osiris. The tombs of the kings, contrary to Egyptian and resembling the Greek custom, were within the walls. The tomb of Amasis consisted of a stone edifice with columns, and a chamber with doors. S. was important as a religious capital. Towards the decline of the monarchy, it rose to great splendour. The 26th dynasty transferred hither the capital of the kingdom. Amasis transported a monolithic shrine of granite from Elephantine to S. after three years' labour, employing 2000 men in the undertaking. Solon and Pythagoras visited S., and Plato was instructed in its colleges. There seems to have been a considerable Greek population in the city; but although S. continues to be mentioned after the 26th dynasty, its political importance then declined, and Memphis became the seat of government. The intercourse between S. and Athens subsequently gave rise to the idea of Athens having been colonised from it. Lepsius, *Briefe*, p. 12; Wilkinson, *Modern Egypt*, vol. i. p. 183; Herodot. ii. 28, 59, 169; Strabo, xvii. p. 801; Champollion, *L'Egypte*, ii. p. 219; *Lettres*, p. 50.

S'AIVAS is the name of one of the three great divisions of Hindu sects. See INDIA. The word designates the votaries of S'iva, and comprises different special sects, which varied in number at different periods of medieval Hinduism. To judge by the number of shrines dedicated to S'iva in his form as Linga, it would seem that the worship of this deity was the most prevalent of all the modes of adoration; but these temples are scarcely ever the resort of numerous votaries, and they are regarded with comparatively little veneration by the Hindus. In Upper India, the worship of S'iva has, indeed, never assumed a popular form. No legends are recorded of this deity of a poetic or pleasing character; the S., unlike the Vaishnavas, have no works in any of the common dialects, such as the *Râmâyan'a*, the *Vârtâ*, or the *Bhaktamâlâ*; no establishments in Hindustan, like S'rînâth or Purî; and their teachers of repute, like S'ankara (q. v.), are too philosophical and speculative to be really popular. The worship of S'iva seems, therefore, to have been, from a remote period, more that of the learned and speculative classes, than that of the masses of the people. In a renowned work called the *S'ankara-dig-vijaya*, or the victory of S'ankara over the world, composed by Anandagiri, one of the disciples of S'ankara, several subdivisions of the S. are named—viz., the *S.*, properly so called—who wore the impression of the Linga on both arms—the *Raudras*, who had a trident stamped on the forehead; the *Ugras*, who had the drum of S'iva on their arms; the *Bhâktas*, with an impression of the Linga on their foreheads; the *Jangamas*, who carried a figure of the Linga on their head; and the *Pâs'upatas*, who imprinted the same symbol on the forehead, breast, navel, and arms. The present divisions of the S., however, are the following: the Dan'd'ins and Das'nâmi-Daudins; the Yogins; the Jangamas; the Paramahansas; the Aghorins; the Urdhabâhus; Âkâs'mukhins and Nakhins; the Gûdaras; the Rûkharas, Sûkharas, and Ûkharas; the Kâralingins; the Brahmachârins; and the Nâgas.

The *Dan'd'ins*, or staff-bearers, properly so called, are the representatives of the fourth order, or mendicant life, into which a Hindu is to enter after he passed through the stages of a religious student, householder, and hermit. The Dan'd'in is distinguished by carrying a *dan'd'a*, or small staff, with several projections from it, and a piece of cloth dyed with red ochre—in which the Brahmanical cord is supposed to be enshrined—attached to it. He shaves his hair and beard, wears only a cloth round his loins, and subsists upon food obtained ready-dressed from the houses of the Brahmans once a day only, which he deposits in the small clay-pot that he always carries with him. He should live alone, and near to, but not within a city; this latter rule, however, is rarely observed. The genuine Dan'd'in is not necessarily of the S'aiva sect; but those who worship S'iva, especially in his form as Bhairava, or the Terrific, have, at the ceremony of initiation, a small incision made on the inner part of the knee, the blood drawn by this process being deemed an acceptable offering to the god. The *Das'nâmi-Dan'd'ins* are included in this class; but they admit none but Brahmans into their body, and are considered to be the descendants of the original members of the fraternity, who refer their origin to the celebrated *S'ankara* or *S'ankarâ-*

chârya (q. v.). He is said to have had four disciples, who are called Padmapa'da, Hastâmalaka, Sure's'wara or Mandana, and Trot'aka. Of these, the first had two pupils, Tîrtha and As'rama; the second two, Vana and Aran'ya; the third had three, Saraswati, Puri, and Bhârati; and the fourth had also three, Giri or Gir, Pârvata, and Sâgara. These ten constitute collectively the Das'nâmi (from *das'an*, ten, and *na'man*, name); and when a Brahman enters into either class, he attaches to his denomination that of the class of which he becomes a member; as Tîrtha, Giri, &c. The philosophical tenets of this sect are mainly those of the *Vedânta* (q. v.), as taught by S'ankara and his disciples; but they generally superadd the practice of the *Yoga* (q. v.), and many of them have adopted the doctrines of the *Tantras* (q. v.).

The *Yogins* are, properly speaking, followers of the *Yoga* (q. v) system; and the term implies a class of men who practise the most difficult austerities, in order to become absorbed into the universal spirit, and thus liberated from repeated births The votaries of S'iva, so called, hold that, by dint of these practices—such as continued suppressions of respirations, sitting in 84 different attitudes, fixing the eyes on the top of the nose—they will be finally united with S'iva, whom they consider as the source and essence of all creation. The principal sect of this class is that of the *Kânphât'â Yogins*, who trace their origin to a teacher named *Gorakhnâth*, who seems to have lived in the beginning of the 15th c., and, according to his followers, was an incarnation of S'iva. A temple of Gorakhnâth exists at Gorakhpur; a plain, called Gorakhkhetr, is near Dwârakâ, and a cavern of his name at Haridwâr. The Yogins of Gorakhnâth are called Kânphâtâs, from having their ears bored and rings inserted in them at the time of their initiation. They may be of any caste; they live as ascetics, single or in colleges; officiate as priests of S'iva in some places; mark the forehead with a transverse line of ashes, and smear the body with the same substance; they deal in fortune-telling, profess to cure diseases with drugs and spells; and some play and sing, and exhibit animals.

The *Jangamas*, or *Lingavats*, are likewise not an important division of the S'aiva sect. Their essential characteristic is the wearing of the Linga emblem on some part of their dress or person.

The *Paramahansas* are ascetics who pretend to be solely occupied with the investigation of Brahman, and to be equally indifferent to pleasure or pain, insensible of heat or cold, and incapable of satiety or want. In proof of this, they go naked in all weathers, never indicate any natural want, and receive from their attendants what is brought to them as their alms or food.

The same apparent worldly indifference characterises the *Aghorins;* but they seek occasions for its display, and demand alms as a reward for its exhibition. Their practices, too, seem to betray that originally their worship was not of an inoffensive kind, but required even human victims for its performance. They eat and drink whatever is given to them, even ordure and carrion; and in order to extort money from the credulous, they resort to the most disgusting devices.

The *Urdhabâhus* are solitary mendicants; they extend one or both arms above their heads till they remain of themselves thus elevated. They also close the fist, and the nails being suffered to grow, completely perforate the hand. They usually assume the S'aiva marks, and twist their hair so as to project from the forehead, in imitation of the matted hair of S'iva.

The *Akâs'mukhins* hold up their faces to the sky till the muscles of the back of the neck become contracted and retain it in that position.

The peculiarities of the other sects we cannot afford space to specify; they are equally trifling, and sometimes disgusting.—For fuller details on the Sa'ivas, see H. H. Wilson, *A Sketch of the Religious Sects of the Hindus;* Works, vol. i. (edited by Dr R. Rost, Lond. 1862), pp. 188, ff.

S'ÂKA. See S'ÂLIVÂHANA.

S'ÂKAT'ÂYANA is the name of a celebrated Hindu grammarian, who preceded Pân'ini (q. v.) and Yâska (q. v), for he is quoted by both these authors. His grammatical work, however seems to be lost, for no portion of it has as yet been forthcoming; and an attempt recently made to identify with it a grammar of a S'âkat'âyana, copies of which are met with at the India Office Library, London, and at Madras, has signally failed. The latter S'âkat'âyana is a Jaina (q. v.), who is not only later than Kâtyâyana (q. v.), but, in all probability, a modern writer.

SAKHALI'N, commonly written SAGHALIEN, native name TARAIKA, a long and narrow island, partly belonging to Russia and partly to Japan, runs from north to south close off the shores of Asiatic Russia in the south-west of the Sea of Ochotsk Area 32,000 sq. m, of which 18,000 sq m, forming the whole northern portion, belong to Russia, and the remainder to Japan. Pop. about 8500 It is 588 miles in length, and about 120 miles in extreme breadth. Lat. 45° 54'—54° 24' N. In lat. 52° the island approaches to within six miles of the mainland, from which it is separated by the shallow Mamia Strait. A mountain-chain with craggy summits, which in lat. 52° are covered with snow throughout the year, traverses the island from north to south. There are no important natural harbours. The chief rivers are the Ty, falling into Patience Gulf, and 90 feet wide and 7 feet deep at its mouth, and the Tymy flowing north-east. The rivers and the coasts swarm with fine fish. Immense stores of fish are preserved in a frozen state during winter, and upon these the natives and their dogs in great part subsist. On the east coast of the island the vegetation, especially in the north, has a stunted appearance. On the west coast luxuriant grass clothes the valleys, and forests of pine, fir, birch, larch, oak, and maple trees cover the mountains. Among the animals are the reindeer, the stag, roe, elk, and musk ox. In the northern part of S. the climate is even more rigorous than at Nikolaevsk (q. v.). At Aniva Bay in the south, the coldest day in the winter of 1853—1854 shewed a temperature of – 13° F. The inhabitants carry on an inconsiderable barter trade with their fish, furs, and seals. Coals have been discovered in several localities and explored by the Russians. Ravenstein's *Russians on the Amur* (Trübner & Co., Lond. 1861).

SAKHALIN ULA HOTUN, now commonly and more properly called Aigun, a town of Manchuria, on the right bank of the Amur, 14 miles below the junction of the Dzeya with that river. Lat. 50° 15' N., long. 127° 40' E. It is the chief place of the Manchu on the Amur, and is sombre in appearance, though it contains many gaily painted temples. The great quadrangle, containing the government and other buildings, is 230 yards square, and is surrounded by double rows of palisades. Paper lanterns hang across the streets, and fantastic figures—dragons, &c.—cut in paper, are fixed to poles above the shops. Millet, tobacco, and other products, are grown in the vicinity for export. Pop. 15,000.

SAKI, a kind of beer which the Japanese make

from rice. It is the common alcoholic liquor of Japan. It is clear, and has a peculiar taste, which Europeans generally reckon unpleasant. The Japanese usually heat it before drinking, and pour it into flat cups or saucers of lacquered wood. It produces a very speedy and transient intoxication.

SAKI (*Pithecia*), a genus of American monkeys, having the tail, which is not prehensile, covered with very long hair, whence they are often called *Fox-tailed Monkeys*. The head is round, and the muzzle short, the ears not unlike those of the human race. The whole body is covered with long hair.

SÂKTAS is the name of one of the great divisions of Hindu sects (see INDIA). The term is derived from the Sanscrit *s'akti*, which means 'power, energy,' but in its special application denotes the energy of the deity, and particularly that of the gods of the Hindu triad, Brahmâ, Vishnu, and Siva. This energy, originally implying of as the wish or will of the Supreme Being to create the universe, was afterwards deified in a metaphorical and poetical sense, as in the Puranik period (see *Hindu Religion*, under INDIA) the form of a particular deity, thought of as the wife of the god to whom it belongs. Accordingly, Saraswatî (q. v.) became the S'akti or wife of Brahman, Lakshmî (q. v.) the S'akti or wife of Vishnu, and Devî, or Durgâ, or Umâ (q. v.) the S'akti or wife of Siva. *S'âkta*, properly speaking, means, therefore, a worshipper of any of these female representations of the divine power; but in its special and usual sense it is applied to the worshipper of the female energy or wife of Siva alone, and the S., properly so called, are therefore the votaries of Durgâ, or Devî, or Umâ (q. v.). Since Siva (q. v.) is the type of destruction, his energy or wife becomes still more so the type of all that is terrific, and in consequence, her worship is based on the assumption that she can be propitiated only by practices which involve the destruction of life, and in which she herself delights. That such a worship must lead to the brutalisation and degeneration into the grossest licentiousness, of those addicted to it, is but natural; and it will easily be understood that the S'âkta religion became the worst of all forms which the various aberrations of the Hindu mind assumed. Appealing to the superstitions of the vulgar mind, it has its professors chiefly amongst the lower classes, and, amongst these again, it prevails especially in Bengal, where it is cultivated with practices even scarcely known in most other provinces. The works from which the tenets and rites of this religion are derived, are known by the collective term of *Tantras* (q. v.); but as in some of these works the ritual enjoined does not comprehend all the impure practices which are recommended in others, the sect became divided into two leading branches, the *Dakshin'âchârins* and *Vâmâchârins*, or the followers of the right-hand and left-hand ritual.

The *Dakshin'âchârins* are the more respectable of the two. They profess, indeed, to possess a ritual as pure as that of the Vedas. Nevertheless they annually decapitate a number of helpless animals, especially kids, and in some cases pommel the animal to death with their fists, or offer blood without destroying life—practices contrary to the Vedic ritual. The *Vâmâchârins*, on the other hand—the type of the S. and amongst these especially that branch called Kaula or Kulîna, adopt a ritual of the grossest impurities. Their object is, by reverencing Devî, who is one with S'iva, to obtain supernatural powers in this life, and to be identified after death with S'iva and his consort. 'According to the immediate object of the worshipper,' Professor Wilson says, 'is the particular form of worship, but all the forms require the use of some or all of the five letters M.—viz., Mânsa, Matsya, Madya, Maithuna, and Mudrâ—i. e., flesh, fish, wine, women, and certain mystical gesticulations. Suitable *mantras* (or formulas) are also indispensable, according to the end proposed, consisting of various unmeaning monosyllabic combinations of letters, of great imaginary efficacy. Where the object of the ceremony is to acquire an interview with, and control over, impure spirits, a dead body is necessary. The adept is also to be alone, at midnight, in a cemetery or place where bodies are burned or buried, or criminals executed; seated on the corpse, he is to perform the usual offerings, and if he does so without fear, the Bhûtas, the Yoginîs, and other male or female goblins become his slaves. In this, and many of the observances practised, solitude is enjoined; but all the principal ceremonies comprehend the worship of S'akti, and require for that purpose the presence of a female as the living representative and type of the goddess. This worship is mostly celebrated in a mixed society, the men of which represent Bhairava (or Siva as the terrific), and the women, Bhairavî (S'akti or Devî as the terrific). The S'akti is personated by a naked female, to whom meat and wine are offered, and then distributed amongst the assistants, the recitation of various Mantras and texts, and the performance of the Mudrâ, or gesticulations with the fingers, accompanying the different stages of the ceremony; and it is terminated with the most scandalous orgies amongst the votaries.' The same author adds that, in justice to the doctrines of the sect, it is to be observed that these practices are instituted merely for s[ens]ual gratification, are held to be as illicit and reprehensible as in any other branch of the Hindu faith;' but full assent must be given to his remark which follows a text quoted by him in support of this view, for he says: 'It is only to be added that if the promulgators of these doctrines were sincere, which is fully impossible, they must have been filled with a strange frenzy, and have been strangely ignorant of human nature.'

'The members of this sect are very numerous, especially amongst the Brahmanical caste; all classes are however admissible, and equal at the ceremonies of the sect. The particular insignia of these S'âktas are a semicircular line or lines on the forehead, of red sanders or vermilion, or a red streak up the middle of the forehead, with a circular spot of red at the root of the nose. They use a rosary made of the seeds of the eleocarpus, or of coral beads, but of no greater length than may be concealed in the hand, or they keep it in a small purse, or a bag of red cloth. In worshipping they wear a piece of red silk round the loins, and decorate themselves with garlands of crimson flowers.' Two other sects are likewise mentioned as belonging to the S., the *Kânchuliyas* and *Karârins*, but it is doubtful whether they are still in existence. The former are said to have belonged to the south of India; and the latter seem to have been worshippers of Devî in her terrific forms, the offering to her of human sacrifices being the principal feature of their ritual. If there are still any votaries of this sect, Professor Wilson believes that they are the miscreants who, more for pay than devotion, at certain festivals, inflict upon themselves bodily tortures, such as piercing their flesh with hooks or spits, reclining upon beds of spikes, gashing themselves with knives, &c.—See H. H. Wilson, *A Sketch of the Religious Sects of the Hindus*, Works, vol. i. (edited by Dr R. Rost, 1862), pp. 240, ff.

S'AKUNTALA is one of the most pleasing

female characters of Hindu mythology. She is mentioned as a water-nymph in the *Yajurveda* (see VEDA); she is the subject of a beautiful episode of the *Mahâbhârata* (q. v.), and is spoken of in the *Purân'as*; but her name has become especially familiar in Europe through the celebrated drama of Kâlidâsa (q. v.), which, introduced to us by Sir William Jones in 1789, became the starting-point of Sanscrit philology in Europe. The principal features of the legend of S., as narrated in the *Mahâbhârata*, are the following: S. was the daughter of the saint Vis'wa'mitra (q. v.) and the Apsaras, or water-nymph, Menakâ. Abandoned by her parents, she was adopted by the saint Kan'wa, who brought her up in his hermitage as his daughter. Once upon a time, King Dushyanta went a-hunting in the forest, and accidentally coming to the hermitage of Kan'wa, saw S., and fell in love with her. He persuaded her to marry him according to the rite of the Gandharva marriage, and promised her that the son she would bear him should be the heir to his throne, and that he would take her home as his queen to his royal city. Kan'wa, who had been absent while this event happened, returned to the hermitage, and through his divine knowledge, knew the whole secret, though it had not been confessed to him by S'akuntalâ. She in due time was delivered of a son, and remained at the hermitage until the boy was six years old; but as Dushyanta, unmindful of his promise, did not send any messenger for her, Kan'wa directed her to proceed with her boy to the residence of Dushyanta. This she did; but when she arrived at his residence, she was repudiated by the king. Nor did her speech, however touching and eloquent, move his heart, until at last a heavenly voice assured him that S. had spoken the truth, and that he saw before him his lawful son. Thereupon, Dushyanta recognised S. as his queen, and her son as his heir. The latter was named Bharata, and became the founder of the glorious race of the Bhâratas. In the drama, Kâlidâsa's genius had full scope to work out the incidents of this legend, so as to display the accomplished female character of S., and likewise to shew that the obstacle which arose to her recognition was not the fault of Dushyanta, but the consequence of a curse which S. had incurred from a wrathful saint who, when once on a visit to Kan'wa's hermitage, had considered himself neglected by her. Since, in the drama, Dushyanta recognises S. by means of a ring he had given her at the hermitage, the name of the drama is *Abhijnâna-S'akuntala*, or 'the drama in which S'akuntalâ (is remembered) by a token.' There are two versions in which this drama now exists—an older and a more recent one. The latter was first edited at Calcutta, 1761, then at Paris, 1830, by A. L. Chézy, who also gave a French translation of it; later and better editions of it (Cal. 1860 and 1864) were prepared by the Pandit Prem Chunder Tarkabâgîsh, under the superintendence of Professor Edward B. Cowell, the Principal of the Sanscrit College at Calcutta. The older version has been edited by Dr O. Boehtlingk (Bonn, 1842), by Professor M. Williams (Hertford, 1853), and by a Bombay Pandit at the Induprakâs'a press (Bomb. 1861). The first English translation of it is that by Sir William Jones (Cal. 1789); the second was made by Professor M. Williams (Hertford, 1856); it deserves the highest acknowledgment, on account of the consummate taste with which it has rendered the metrical part of the original. Among the various German, Italian, Danish, and other translations of this drama, the German translation by Ernst Meyer (Stutt., 1852) is worthy of especial notice.

S'ÂKYAMUNI, or the SAINT S'ÂKYA, is a name of *the* Buddha, the founder of the Buddhist religion. See BUDDHISM.

SAL (*Vateria robusta*), a tree of the natural order *Dipteraceæ*, one of the most valuable timber trees of India. Great sal forests exist along the southern base of the Himalaya Mountains, but in many places they have been nearly cut down. The care of government is now extended to their preservation.

SALAA'M (*Salâm*, Arab. = Heb. *Shalom*, peace), the general term of salutation among the Mohammedans. They are generally very formal in their social manners, although their demeanour and conversation are unrestrained enough, both among men and women. Several of their social usages in this respect are founded upon religious precepts; among these is the custom of greeting each other with the words: 'Es salâmu aleikum' (Peace be with you), which is answered by: 'With you be peace, and the mercy of God, and His blessings!' This salutation is neither to be addressed to nor to be received from any non-Mohammedan. The reply, when one Moslem salutes another, is obligatory, while the address itself is rather arbitrary. Should the saluted refuse to reply, then the other may revoke his salutation, as he does in the case of his discovery that the person saluted is not a true believer, with the words: 'Peace be on us and on all the righteous worshippers of God.' Generally, the rider salutes the person on foot, the passer by those who sit down or stand still; the smaller party salutes the larger, the young the older, &c. Salutation is to be the first and the last thing on entering a house. The following is the rising scale of the different modes of obeisance with the Moslem: 1. Placing the right hand upon the breast; 2. Touching the lips and the forehead or turban (or forehead and turban only) with the right hand); 3. Doing the same, but slightly inclining the head during that action; 4. The same, but inclining the body also; 5. The same, previously touching the ground with the right hand; 6. Kissing the hand of the person to whom the obeisance is paid; 7. Kissing his sleeve; 8. Kissing the skirt of his clothing; 9. Kissing his feet; 10. Kissing the ground. This, however, is to be understood (against De Sacy) as merely touching the ground previous to touching the lips and forehead with the right hand. The first five modes are accompanied by the 'Peace be with you,' and the reply given above. The sixth mode is observed by servants or pupils to their master, wife to husband, and children to father, and sometimes mother, by the young to the aged, and the less learned to the learned and pious (Lane, *Notes to Arab. Nights*, &c.).

SALAD, the name given to a preparation of raw herbs for food. It derives its name from the fact that salt is one of the chief ingredients used in dressing a salad. The principal salad herbs are lettuce, endive, chicory, celery, mustard, and cress; water-cress, onions, radishes, chervil, and a few savory herbs used to give flavour. They are usually cut up, and mixed with salt, vinegar, oil, and other condiments, according to taste. Sugar is also frequently added. Cresses, seed-leaves of mustard, &c., are often eaten without any addition. Salad has always been a favourite food with civilised nations, and has very little varied in its composition. The Romans used it, and made it thus: Cultivated endive was cut small after careful washing and draining, then gravy and oil were poured over it; and finely-minced onions were strewed over the whole; then a little vinegar and honey was added, and the salad served up. The great value of salads is in the fact that they are uncooked,

and consequently contain a larger quantity of mineral matter, such as potash, soda, &c., than if boiled. Salads are sometimes prepared with animal food, such as boiled lobsters, crabs, eggs, &c.

SALADIN, the name given by western writers to SALAH-ED-DIN YUSUF IBN AYUB, the sultan of Egypt and Syria, and the founder of the Ayubite dynasty in those countries. As the great Moslem hero of the third crusade, and the beau-idéal of Moslem chivalry, he is one of the most interesting characters presented to us by the history of that period. He belonged to the Kurdish tribe of Ravad, and was born at Tekreit (a town on the Tigris, of which his father Ayub was *kutwal* or governor under the Seljuks) in 1137. Following the example of his father and uncle, he entered the service of Noureddin (q. v.), prince of Syria, and accompanied his uncle in his various expeditions to Egypt in command of Noureddin's army. S. was at this time much addicted to wine and gambling, and it was not till, at the head of a small detachment of the Syrian army, he was beleaguered in Alexandria by the combined Christians of Palestine and Egyptians, that he gave indications of possessing the qualities requisite for a great captain. On the death of his uncle, Shirkoh, S. became grand-vizier of the Fatimite calif, and received the title of *El-melek-el-nasr*, 'the Victorious Prince;' but the Christians of Syria and Palestine, alarmed at the elevation of a Syrian emir to supreme power in Egypt, made a combined and vigorous attack on the new vizier. S. foiled them at Damietta, and transferred the contest to Palestine, taking several fortresses, and defeating his assailants near Gaza; but about the same time his new-born power was exposed to a still more formidable danger from his master, Noureddin, whose jealousy of the talents and ambition of his able young lieutenant, required all the skill and wariness at S.'s command to allay. On Noureddin's death, in 1174, S. began a struggle with his successor, which ended in his establishing himself as the sultan of Egypt and Syria, a title which was confirmed to him by the calif of Bagdad. The next ten years were occupied in petty wars with the Christians, and in the arrangement and consolidation of his now extensive dominion. The plundering by the Christians of a rich pilgrim caravan on its way to Mecca, an infringement of the treaty with S., brought down upon them the latter's vengeance; their army suffered a dreadful defeat at Tiberias (4th July 1187); the king of Jerusalem, the two grand-masters, and many other warriors of high rank were taken captive; Jerusalem was stormed (2d October), and almost every other fortified place in Palestine was taken. The news of this great success of the infidels being brought to Western Europe, aroused the enthusiasm of the Christians to its highest pitch, and a powerful army of crusaders, headed by the kings of France and England, speedily made their appearance on the scene of strife. They captured Acre in 1191, and Richard Cœur-de-Lion, at the head of that portion of the crusading army which adhered to him, continued the war with success, twice defeated S., took Cæsarea and Jaffa, and finally obtained a treaty for three years (August 1192), by which the coast from Jaffa to Tyre was yielded to the Christians. In the following year, S. died at Damascus of a disease under which he had long suffered. S. was not a mere soldier; his wise administration left behind it traces which endured for centuries; and the citadel of Cairo and sundry canals, dikes, and roads are existing evidences of his careful attention to the wants of his subjects. In him the warrior instinct of the Kurd was united to a high intelligence; and even his opponents frankly attribute to him the noblest qualities of medieval chivalry, invincible courage, inviolable fidelity to treaties, greatness of soul, piety, justice, and moderation.

The Ayubite dynasty of which he was the founder ruled over Syria till 1259, when it was dispossessed by the Perso-Mongols, and over Egypt till the rise of the first Mameluke kingdom under Ibeg in 1250.

SALAMA'NCA, one of the three modern provinces of Spain, into which the ancient kingdom of Leon (q. v.) was divided. Area about 4876 sq. m.; pop. (1857) 263,516.

SALAMANCA, a famous town of Spain, capital of the modern province of the same name, stands on three rocky hills on the right bank of the Tormes, 50 miles east-north-east of Ciudad Rodrigo. Prior to its almost total destruction by the French in 1812, it was renowned for the number of its splendid edifices and institutions, and even yet it is a rich mine for the architect, abounding as it does in magnificent specimens of simple and florid Gothic, as well as of the richest cinque-cento. It is surrounded by a wall, pierced with nine gates, and a part of which is very old. The narrow, crooked, dark, and steep streets, containing many old and stately structures, the residences of the old nobility, give to the town an antique and venerable look. Besides the old cathedral, a simple and massive edifice, it contains five other churches of the 12th century. The new cathedral, begun in 1513, is a magnificent structure in florid Gothic, in the adornment of which painting, gilding, and sculpture have been largely and most successfully used. At the close of the 18th c., S. contained 27 parish churches, 39 convents, and 25 colleges. Of the colleges, 20 were destroyed by the French while the town was in their possession, as well as about 20 of the convents, for the purpose of obtaining materials for the erection of fortifications, and for firewood. The university of S., with which the university of Palencia (q. v.) was incorporated in 1243, was founded in 1200. It consisted of a number of colleges, divided into *Mayores* and *Menores*, or larger and smaller colleges. Of the former, there were only six in Spain, and four of these were at S.: the other colleges were 21 in number. In the 14th c., the university was attended by 17,000 students; the attendance is now only 500. The library, according to an official statement of 1835, contains 21,000 volumes and 1500 MSS. The school of S. is interesting to British subjects as having, from an early period, included a college for Irish students, which supplied many of the ecclesiastics who continued to minister to their countrymen during the penal times, and which is still in existence. One of the most highly-prized works in Roman Catholic divinity is the great collection of Controversial and Moral Theology, by the members of the college of Carmelite friars in S., who are known by the name of *Salmanticenses*, or the *Salamanca Theologians*. The *Plaza Mayor* is the largest square in Spain, and when fitted up as a bull arena, which it occasionally is, it offers accommodation to from 16,000 to 20,000 persons. The bridge across the Tormes rests on 27 arches, and is of Roman foundation. Manufactures of cloth, leather, and earthenware are carried on. Pop. 17,700.

S., the ancient *Salmantica*, was a Roman *municipium*. In the vicinity was won one of the most famous victories of the Peninsular War, by the British under Wellington against the French under Marmont, 22d July 1812.

SALAMA'NDER, in the superstitions of the middle ages, denoted a being possessing the shape of a man, whose element was the fire, or who at

least could live in that element. Paracelsus placed salamanders among the elementary spirits.

SALAMANDER (*Salamandra*), a genus of Batrachians, of the family *Salamandridæ*, to which Newts (q. v.) also belong. The name is, indeed, sometimes extended to the whole family; newts being called *Aquatic Salamanders*, and the name *Terrestrial S.* being given to this genus, the species of which inhabit water only in their tadpole state, and return to it only to deposit their eggs, generally living in moist places, as under stones, roots of trees, &c. The general form is very similar to that of newts, but the tail is round, not flat as in newts. Several species are found in Europe; none of them, however, in Britain. The SPOTTED S. (*S. maculosa*), six or eight inches long, black, with bright yellow



Spotted Salamander (*S. maculosa*).

stripes on its sides, and livid blue beneath, is widely spread throughout Europe. The BLACK S. (*S. atra*) is much smaller, black, the body and tail ringed, the tail almost as if formed of beads. It is abundant in the Alps and mountains of Southern Germany. Other species are found in Spain, Italy, &c.; Asia and North America also produce numerous species. Salamanders feed on worms, slugs, snails, and insects. They are inert and sluggish creatures and timid to the utmost extent that their stupidity permits. The brain is very small. They are perfectly harmless, although exuding, when alarmed, from pores on the back and sides, a milky humour, which is injurious to very small animals. But they have long had, and still retain, a popular reputation of extreme venomousness, and are therefore objects of the utmost dread to the vulgar in almost all countries which they inhabit. Strange fables have been current concerning them from remote ages, particularly concerning the icy cold which envelops their body, and enables them not only to endure fire without burning, but to extinguish fire. Pliny, indeed, records that he tried the experiment, and the poor S. was burned to powder; yet the fable continued to be credited until very recent times.

SA'LAMIS (modern name, *Koluri*), in ancient times called also *Pityoussa* (Island of Pines), an irregularly-shaped, mountainous island of Greece, off the coast of Attica, and forming with it the Bay of Eleusis. Its area is about 30 sq. m., and it has a modern population of about 5000, the chief town being Koluri, on the west coast. It had anciently two principal towns, Old and New Salamis, the former on the south, and the latter on the north-east coast. S. is remembered chiefly on account of the great naval battle between the Greeks and Persians, which was fought (480 B.C.) a few days after the battle of Thermopylæ, in the narrow strait between the east coast of S. and the west coast of Attica. The Grecian fleet, consisting of about 360 vessels, was drawn up at the entrance of the bay forming the harbour of New Salamis, Themistocles being leader of the Athenian contingent, and Adimantus of the Corinthian, while the whole was under the command of the Spartan Eurybiades. Great dissensions prevailed among the Grecian leaders, which would probably have led to a general break-up, had not Themistocles by a stratagem induced Xerxes, king of the Persians, to bring up his fleet, and give immediate battle to the Greeks. Xerxes drew up his ships, numbering at least 1000, during the night previous to the battle, opposite the Grecian fleet, along the coast of Attica, almost completely blocking up both entrances to the straits; and confident of victory if he himself superintended operations, he took his seat on a throne erected on a lofty height on the Attic coast, almost opposite New Salamis. Both Greeks and Persians fought with great bravery, but the latter were entirely defeated, owing, perhaps, chiefly to their immense, unwieldy fleet being compressed into so small a space, which rendered it almost unworkable, and completely at the mercy of their opponents. The only name mentioned on the Persian side with distinction is that of Artemisia, queen of Halicarnassus, who is said to have fought with desperate bravery. The loss of the Greeks is said to have been 40, and that of the Persians 200 ships, exclusive of those which were captured.

SAL AMMO'NIAC (known in Chemistry as HYDROCHLORATE OF AMMONIA) is an article of considerable importance in the Materia Medica. It is obtained on a large scale by decomposing with common salt (chloride of sodium) the sulphate of ammonia, which is formed in the manufacture of coal gas, or the carbonate of ammonia, obtained by the distillation of bones. It is sold in large, crystalline, grayish white, semi-transparent cakes, convex on one side, and concave on the other. It is inodorous, but possesses an acrid, bitter, and nauseous taste. Its specific gravity is 1·45; it volatilises without decomposition when heated, and is freely soluble in water. Its aqueous solution, when heated with caustic potash, evolves gaseous ammonia; and when treated with nitrate of silver, yields a white, curdy precipitate of chloride of silver. This salt is largely given in France and Germany in cases of pneumonia and of inflammation of the serous membranes, in mucous diarrhœa, in chronic rheumatism and gout, and in passive dropsies. Neligan recommends it in cases of low fever, in subacute laryngitis, in chronic affections of the liver, and in facial neuralgia. It may be given in doses varying from 10 to 30 grains, dissolved in some aromatic water. As a local external application, it is of great value in promoting the absorption of effused blood; and there is probably no remedy so effectual for that common but disfiguring affection popularly known as *a black eye*, as a moderately strong solution of this salt, kept constantly applied as a lotion. If it is desired to apply cold to any part of the body, an excellent Refrigerant (q. v.) may be obtained by dissolving five parts of this salt and five parts of nitre in sixteen parts of water.

S. A. is employed for various purposes in the arts. It is used in soldering, and in the tinning of copper and iron to prevent the oxidation of the surface to be tinned. It is exported from Britain to Russia, where it is used by dyers.

It occurs as a mineral, as an efflorescence on the surface of rocks, or as a sublimate in fissures, crystallised in small crystals, or forming crusts, stalactites, &c. It is found in volcanic regions, but is produced during the time of the quiescence of active volcanoes, rather than during their eruptions. It occurs in Britain, near burning beds of coal. It is found in Persia, Tartary, Siberia, and many other countries, where there are no active volcanoes.

Formerly, all Europe was supplied with it from the neighbourhood of the temple of Jupiter Ammon in Egypt, whence its name

SALDA'NHA BAY See Cape of Good Hope

SALE, George, an eminent oriental scholar, was born towards the end of the 17th c., and died at London in 1736 under forty years of age Almost nothing is known of his private life He is supposed to have been born in Kent, and he received his education at the King's College, Canterbury Brought up to the law, he is believed to have practised it almost to the end of his life That he spent five and twenty years in Arabia, as Voltaire and many after him asserted, is a complete fiction He assisted in getting up the *Universal History* together with Swinton, Shelvocke, Campbell, George Psalmanazar, and A Bower each remarkable enough in his way—for which he wrote the cosmogony and several portions of ancient history He was also one of the authors of the *General Dictionary* but he is best known by his unrivalled translation of the Koran 'with explanatory notes taken from the most approved commentators, to which is prefixed a preliminary discourse' (1734) This 'preliminary discourse,' which is [illegible] and proves S to have been deeply versed in oriental literature treats [illegible] of the Arabs before Mohammed or, as they express it in the "time of ignorance;" their history, religion, learning, and customs [illegible] the state of Christianity particularly of the Eastern churches, and of Judaism at the time of Mohammed's appearance and of the methods taken by him to establish his religion and the circumstances which concurred thereto [illegible] the doctrines, precepts, and [illegible] of the Koran, and of the principal Mohammedan sects S's work was translated into French by Dupsyar (Antw 2 vols 1770 [illegible] a new epoch in the study of Islam and its literature and though many other translations have been attempted since, in nearly all European and oriental languages, it still bears the palm See Koran That his contemporaries fastened the charge of heresy upon one who spoke [illegible] and humanely of other creeds [illegible] After his death, a catalogue of his oriental MSS was published and the contents [illegible] now in the Radcliffe Library, Oxford

SALEM, a town in the south of India, capital of the collectorate of the same name The collectorate is the chief seat of the Indian *steel manufacture* a branch of industry as curious as it is ancient The town stands in an elevated valley 1070 feet above sea level, bounded on the north and south with hills 193 miles south west of Madras It is well built containing a number of handsome two storied houses, and is surrounded by land in a high state of cultivation Cotton is grown in the vicinity in quantity more than sufficient for the use of the numerous cotton weavers who, together with the silk weavers, form the great mass of the non agricultural inhabitants of the town Pop 19,000

SALEM, a city and port of entry of Massachusetts, U S, 14 miles north east of Boston on a peninsula 2 miles long by ¾ths of a mile broad, with irregular but well built streets, and a fine harbour, from which was formerly carried on a large trade with China, the East Indies, and Eastern Africa The principal institutions of S are the East India Marine Society, which is composed of men who have doubled the Cape of Good Hope, and has a large museum of oriental curiosities, the Essex Institute, with a library of 18,000 vols, and a picture-gallery; and the Salem Athenæum with a library of 13,000 vols. There is a normal and grammar school, 5 newspapers, 7 banks, 21 churches, a cotton mill, with 65,000 spindles, and manufactures of chemicals, varnishes, leather, shoes, machinery, &c S was settled in 1626, and is the oldest town, except Plymouth, in New England. The first church was organised in 1629 In 1692, a great witchmania broke out, and 19 persons were hung for 'witchcraft' In the war of the revolution, S sent out 158 privateers, which took 455 prizes. Pop in 1860, 22,252

SALE OF GOODS is a contract by which the seller in consideration of a price, transfers the property in the goods to the purchaser Where the consideration is not money but goods, the contract is called exchange or barter The law on the subject is not the same in England and Scotland In England, when the bargain is struck, and the sale relates to specific goods—that is goods already made, and existing, and identified—the property vests at once in the purchaser, so that in the event of any damage or destruction happening to the goods, the loss is that of the purchaser and not of the seller even though the goods have not been delivered, and whether the price has been paid or not The contract may be made either by word of mouth or by writing but when the price exceeds £10, the statute of Frauds enacts that the contract shall not be binding unless it is in writing If, however, the buyer shall have accepted part of the goods sold and actually received the same or if he shall have given something in earnest to bind the bargain, or in part payment then a verbal contract will be binding, though the price exceeds £10 Many nice questions have occurred and constantly recur as to what amounts to an acceptance and delivery of the goods [illegible], that the general policy of restricting the proof of the contract to writing in any case has been much complained of [illegible] and efforts have been made, but as yet in vain to repeal the statute of Frauds which, it is said, encourages rather than discourages fraud When a contract of sale is made, the duty of the seller is to deliver the goods as soon as the buyer has performed all the conditions agreed upon If no time was specified for delivery, then he must deliver the goods in a reasonable time In general, if nothing is agreed to the contrary, the seller need not deliver till the price is paid, but he must do so if the bargain was, that delivery was to take place before payment, in other words, if the sale was on credit On the other hand, it is the duty of the buyer to accept the goods and pay for them If either party fail at any stage in his performance of the duties arising out of the contract, the other may bring an action which varies according to the nature of the breach of contract One valuable right of the seller, when he has sent his goods to the buyer and they are in course of delivery, but not already delivered, is to stop them *in transitu*, this stoppage *In Transitu* (q v) being chiefly resorted to when the seller hears of the bankruptcy of the buyer after he has sent away the goods.—In Scotland, the chief points of difference from the law of England as to sale are these. The rule is, that no writing whatever is necessary to make the contract binding, whether the price exceeds ten pounds or not Again, the rule is, that the property in the goods does not pass until they are either actually or constructively delivered to the buyer.—See Paterson's *Compendium*, 2d ed. ss. 520—544.

SALE OF LAND differs from sale of goods in several respects. An agreement for the sale of land must be in writing, otherwise it cannot be enforced. When once a contract for the sale of land has been entered into, a Court of Equity will, contrary to the general rule which prevails when a contract is

broken, enforce specific performance of the contract, that is, will compel the seller or buyer to carry out his contract, and transfer or accept conveyance of the land When a sale of land is agreed upon, and nothing is said as to the matter, it is understood, as part of the contract, that the vendor shall be able to make a good title, and a doubtful title cannot be forced on the vendee even though it is accompanied with an indemnity The rule is, that the abstract of title—i e, a short account of the series of former transactions relating to the possession and property—must go back for sixty years The expense of making searches into registers during that period falls on the purchaser It is the duty of the purchaser's solicitor to prepare the draft of the conveyance, and tender it for approval to the vendor's solicitor, and unless there is an agreement to the contrary, the purchaser pays the expense of the conveyance When the vendor has delivered possession of the estate to the purchaser without receiving the purchase money he still retains a lien on the estate for the unpaid price In England there is no general register which contains copies of all the deeds relating to land so that everything depends on the preliminary inquiry between the two parties and the certainty that the purchaser has obtained all the material information that exists The consequence is that the sixty years title previous history of the estate involves the purchaser in great expense This expense requires to be renewed on every fresh sale and a solicitor who neglects to go through the same form of inquiry as his predecessor at the time of the last preceding sale would be personally liable for any loss that occurred thereby The great expense attending the conveyance of land has of late years been loudly complained of and the manufacturing interest familiar with the rapidity of similar transactions relating to goods has demanded a simplification of the process In order to meet this demand which has been [illegible] by the public in general, two acts of parliament were passed in 1862, for the purpose of founding a land registry and enabling an owner of land to have his title examined and registered once for all that in the event of future transactions he may be saved the expense and delay required under the old system These acts of parliament, however, [illegible] compulsory, and the interest of solicitors being opposed to their being resorted to little progress has been made in making the new practice universal In Scotland the law relating to the sale of land has always been on a more satisfactory footing, for there are registers in which an intending purchaser can with certainty find all the deeds and nearly every burden that can attach to the land he wishes to buy, so that he can almost at a glance ascertain what are the dangers and drawbacks attending the transaction See REGISTRATION OF DEEDS AND WRITS In Scotland the expense of the conveyance of land falls on the vendor, if there is no agreement to the contrary, and the vendor's solicitor prepares and tenders the draft conveyance while the purchaser pays his own solicitor for perusing and approving the draft conveyance, but in practice the expenses of conveyance are usually equally divided between vendor and purchaser

SALEP, the tubers of many species of *Orchis* and other *Orchideæ*, dried and used as an article of food Of the two tubers usually found at the roots of these plants, only one is gathered for salep, the younger and more solid of the two The tubers are gathered when the stalk is about to fall They vary from the size of a cherry stone to that of an olive They are cleaned, dipped for a few minutes in boiling water, and dried as quickly as possible, by which process they are rendered hard and horny The greater part of the salep of commerce is brought from the East, and much of it from Persia; it is supposed to be obtained from species of *Eulophia*, but most of the European species of *Orchis* are used for it

Before coffee became so common in Britain, salep was an article of considerable importance, and large quantities were imported from Turkey, Persia, and India In France it is still in considerable request. For use it is ground into a fine powder, and mixed with boiling water, sugar and milk being added according to taste As a cant drink, it was considered very nutritious and wholesome and thirty years ago it was sold ready prepared, to the working classes of London early in the morning, from numerous street stalls Its principal constituents are *bassorine*, starch, and phosphate of lime

SALERNO (ancient *Salernum*) a city of Southern Italy, chief town of the Principato Citra, on the northern side of the gulf of the same name, 32 miles east south east of Naples, with a population of 29,000 A Gothic wall, built of huge stones without mortar, encircles it, the streets are paved with lava, and, with the exception of the two principal ones are narrow, irregular, and dirty It has a strong castle and a very small harbour The old and beautiful Gothic cathedral was erected by the Normans, and has around it a portico of porphyry and granite pillars brought from Pæstum by Robert Guiscard It has many famous sepulchres, among others those of Robert and Guillaume Guiscard, of Margaret of Anjou, and of Gregory VII It was celebrated in the middle ages for its school of medicine (the *Schola Salernitana*), founded by Robert Guiscard about the end of the 11th c, and which was long the first medical school in Europe The university has fallen into decay In its neighbourhood which produces excellent wine, are the ruins of Pæstum which was destroyed by the Saracens in the 9th century Of ancient Salernum or Salernum there still exist the Temple of Neptune that of Ceres and the ruins of an amphitheatre and of a theatre S was founded by the Greeks it became important under the Roman empire then passed into the possession of the Goths and of the Lombards Robert Guiscard made himself master of it in 1076 Charles V. united it to the kingdom of Naples

SALERNO GULF OF (*Sinus Pastanus*, on whose shore in early times the Greek city of Pæstum [Posidonia] stood) is a nearly semicircular inlet on the western shores of Southern Italy, south of the Bay of Naples, from which it is separated by the promontory ending in Point Campanella The Gulf is 36 miles wide at its entrance, and was [illegible] for 24 miles On its shores are the towns of Amalfi and Salerno

SALES, FRANCIS DE, a most distinguished saint of the Roman Catholic Church was born August 21, 1567, at the family castle of Sales, near Annecy in Savoy He was the heir of the family honours, and his education was designed by his father to fit him for the career of distinction to which his position seemed to entitle him From the provincial colleges of La Roche and Annecy, he was sent to Paris in 1578, where he entered the then brilliant school of the Jesuits, and completed under their care the course of rhetoric and philosophy In 1584, he went to Padua, for the course of civil law, and pursued his studies there with great distinction till 1591 At this time, his father, who had obtained for him a place in the senate, proposed to him a very brilliant and advantageous marriage, but he had already resolved to devote himself to the ministry, and with

much difficulty obtained his father's consent to enter into orders in the diocese of Geneva. He soon became distinguished as a preacher, and the zeal with which he discharged the ordinary duties of his ministry was no less remarkable. Very soon after his ordination, he was employed by his bishop in a mission for the conversion of the Calvinistic population of Chablais, which had been recently annexed to the duchy of Savoy, and in which the duke was desirous of having the Catholic religion re-established. The success of this mission was almost unprecedented. With a companion equally devoted, he travelled on foot from town to town, and in a short time he succeeded in reclaiming many to the church. One of the most remarkable incidents of his mission was a conference with the celebrated Calvinist leader, Theodore de Beza. Of this interview, very different accounts are given by the rival partisans; but all agree in admiration of the gentleness and enlightened liberality of Francis de Sales. At the termination of this mission, Francis was, in 1596, appointed coadjutor to the Bishop of Geneva, Mgr. Granier, with the title of Bishop of Nicopolis. It was with much difficulty that the pope, Innocent IX., induced him to accept this dignity. Some time afterwards, having occasion to go to Paris, he was invited to preach the Lent in the chapel of the Louvre; and his lectures, which were partly controversial, were reputed to have had so much influence in bringing about the conversion of several of the Huguenot nobles, that the king tried to induce him to accept a French bishopric; but in vain. He returned to his diocese; and soon afterwards, on the death of Mgr. Granier, he succeeded to the bishopric of Geneva. His administration of this charge, upon which he entered in December 1602, was beyond all praise. Being again invited to preach the Lent at Dijon, in furtherance of the plans of Louis XIV. for the conversion of the Huguenots, he was again pressed by that monarch to accept a French bishopric. But he again declined this honour, as he also declined in 1607 the offer of the cardinalate from the pope Leo XI. It was about this time that he published his well-known *Introduction to a Devout Life*, which has continued to the present day one of the most popular manuals of piety and the ascetic life. Among his measures for the renovation of the monastic spirit, a very important one was the establishment of a congregation of nuns of the order of the Visitation, under the direction of the now celebrated Madame de Chantal, with whom he long maintained a correspondence on every subject connected with the spiritual and religious life, which was published in 1660, and which still remains a subject of almost undiminished interest for the spiritualist. In 1608, his infirmities compelled him to solicit the assistance of a coadjutor in the charge of his diocese. He continued, however, to labour to the last. His last sermon was delivered at Lyon on Christmas eve in 1622; on Christmas-day he was seized with paralysis, and on the 28th of the same month, he expired. He was buried in the church of the Visitation in that city, but his remains were afterwards translated to Annecy. More than forty years after his death, in 1665, he was solemnly canonised as a saint by Alexander VII. His festival is held on January 29, the day of the translation of his relics to Annecy. His works were published in a collected form in 2 vols. folio at Paris in 1641; but the separate works (especially the *Devout Life*, which has been translated into almost every European language), have passed through innumerable editions, and still retain their popularity.

SALEY'ER ISLANDS, THE, lie in the Indian Ocean, to the south of Celebes. Upwards of thirty of the group are small, hilly, densely wooded, and, with few exceptions, uninhabited. Great Saleyer, in 5° 44'—6° 26' S. lat., and 120° 23'—120° 37' E. long., is upwards of 40 miles in length, and 7 in breadth, the area being 336 sq. miles. The mountains on the east coast rise abruptly out of the sea, and along the west is a slip of level land planted with cocoa-nut trees. Pop. 60,000. Great Saleyer and the smaller islands produce fine timber, including ebony and teak. Indigo, coffee, and mustard are grown; but millet, maize, earth-fruits, and cotton are the staple cultures, the grounds being carefully fenced. Agriculture is the chief employment, and fishing, making salt, &c., are also carried on. The exports are cocoa-nuts, cocoa-nut oil, cotton, and cotton fabrics. Imports—rice, gambir, tobacco, yarns, iron and copper wares. Since the Netherlands' government made Macassar a free port, sea-going ships are not permitted to anchor at Saleyer; and the trade is carried on by small vessels, which sail between that island, the Bight of Boni, Sumbawa, Bali, Borneo, Java, Macassar, and Singapore. The sea is rich in various kinds of fish —a long and thin species, the Saleyer, giving a name to the island.

The S. I. are governed by fourteen rajahs, superintended by a Netherlands' agent. The natives are Mohammedans, each large village having a mosque and priest. The high priest resides near the political agent, has a seat in the council, and is consulted on religious questions. Some of the rajahs and notables have tables and chairs, tea and dinner services, silver spoons and forks, mattresses, cushions, and even satin bed-curtains.

SA'LFORD, a municipal and parliamentary borough, Lancashire, is considered as virtually a portion of the city of Manchester (q. v.).

SA'LICIN ($C_{26}H_{18}O_{14}$) is a member of the group of organic compounds to which the term *glycosides* has been recently applied by chemists—a group which is specially characterised by the fact, that each of its members, when exposed to certain chemical agencies, breaks up (usually after the absorption of water) into glycose (or grape-sugar) and other compounds. It occurs in the bark of the various species of willow and poplar, in the blossoms of several species of *spiræa*, and probably in the animal secretion known as *castoreum*. It may be obtained in small, colourless, glistening prisms of an intensely bitter taste, which are readily soluble in hot water and in alcohol, and moderately soluble in cold water, and are insoluble in ether and oil of turpentine; and its solutions exert a left-handed rotatory action upon a ray of polarised light. When heated to 248°, salicin fuses; and at a higher temperature, it is entirely decomposed. It dissolves in strong sulphuric acid, the solution being of a purple or blood colour. Salicin is manufactured to a considerable extent as a cheap substitute for quinia. There are various modes of extracting it from the macerated bark; and 1 lb. of the bark of *Salix pentandra* yields, according to Erdmann, 5 drachms of salicin. If it is not so certain in its action as a febrifuge as quinia, there can be no doubt that it is an excellent tonic; and it possesses this advantage over the latter substance, that it is less liable to irritate the stomach. Dr Neligan, in his excellent work on *Medicines*, states that he has used it very extensively as a tonic in the debility following acute diseases, particularly in cases accompanied by irritability of the digestive organs, and considers its powers to be fully equal to those of sulphate of quinia. As a tonic, two grains may be given three or four times a day; as a febrifuge, from one to two scruples in divided doses, during the

intermission. It may be prescribed as a powder mixed with sugar, or dissolved in water, with the addition of some agreeable syrup.

SA'LIC LAW. The code known as the *Salic Law* is a collection of the popular laws of the Salic or Salian Franks (see FRANKS) committed to writing in barbarous Latin in the 5th c., while the people were yet heathens. There exist several texts of this code, and considerable obscurity rests over its history. It relates principally to the compensation and punishment of crimes, and there is a chapter containing provisions regarding the succession to what are called *Salic Lands*, which seems to have been inserted at a later date. It is difficult to determine precisely what these lands were. The *terra salica* was probably so called from its being more especially attached to the *sal* or hall of the lord or proprietor (some derive *salic* as applied to the people from the same word), it thus came to designate inherited land as opposed to property acquired otherwise. Although the Frankish law did not in general exclude females, the succession to these salic lands, whatever they were, was confined to males, probably from the importance of securing the military service of the chief proprietors. It was but a doubtful analogy that led the rule of succession to Salic lands to be extended to the succession to the French crown, and it seems to have been only in the 14th c. that the exclusion of females from the throne became an established principle. The accession of Philip the Long was probably the first occasion on which it received public sanction, and the fact that Edward III. rested his claim on female-succession, doubtless led to that instance being regarded as an unquestionable precedent for all future time.—See Hallam's *Europe in the Middle Ages* (ch. ii. pt. 1, and notes); Guizot, *Essais sur l'Histoire de France*, p. 91.

SA'LIENT, in Heraldry, an attitude of a lion or other beast, differing but slightly from *Rampant* (q. v.). He is supposed to be in the act of springing on his prey, and both paws are elevated. Two animals *counter salient* are represented as leaping in opposite directions.

SALIENT, in Fortification, is that which points outwards from the interior of any work. For example, the central angle of a bastion, pointing towards the enemy, is a salient angle.

SALIFEROUS SYSTEM, the name given by the earlier English geologists to the New Red Sandstone (q. v.) formations, because the deposits of salt in England occur in these strata. As, however, this substance has been found associated with strata of all ages in different parts of the world, the name has been given up.

SA'LIFIABLE BASE, a term applied in chemistry to any substance capable of uniting with an acid to form a salt.

SALI'NA, or **SALINI,** one of the Lipari Islands (q. v.).

SA'LINE PLANTS are those which require for their healthy and vigorous growth a considerable supply of *chloride of sodium* (common salt) and other salts, and which are therefore limited to peculiar situations. Few of them are strictly aquatic plants, except the marine Algæ, or Sea-weeds, which grow immersed in salt water, either always or in certain states of the tide, and derive their nourishment from it through their fronds, and not by roots from the rock to which they are attached. Grass-wrack (q. v.), however, is an instance of a phanerogamous plant living entirely and always immersed in salt-water. Other phanerogamous plants grow chiefly or only on the sea-shore and in salt marshes. Some of these, however, as the sea-kale, may be cultivated in gardens remote from the sea, but they succeed best when liberally supplied with salt. Asparagus is another well-known garden-plant, which derives much benefit from similar treatment. Some of the Saltworts (q. v.) and other saline plants yield much soda when collected and burned, and the produce was at one time largely imported into Britain from Spain and other countries under the name of Barilla (q. v.). The dry steppes of Russia and Tartary, having in many places a strongly saline soil, are covered with a very peculiar vegetation. Among the ornaments of these steppes is *Halimodendron argenteum*, a shrub of the natural order *Leguminosæ*, often cultivated in gardens for its beautiful rose-coloured flowers and silvery gray leaves. Saline plants have their whole tissues impregnated with salt.

SALINE POWDER, COMPOUND, is a very popular and harmless form of aperient medicine. The ordinary method of preparing it is by drying, at a gentle heat, and then pulverising 4 oz. of pure chloride of sodium (common salt), 4 oz. of sulphate of magnesia (Epsom salts), and 3 oz. of sulphate of potash. These salts must then be mixed and triturated together, and kept in an air-tight vessel. Two or three drachms dissolved in half a pint of water, and taken before breakfast, usually act efficiently. Dr Neligan states that if 4 oz. of sulphate of soda be used instead of the sulphate of potash, and a sufficiently high temperature be employed to expel all the water of crystallisation from the different ingredients, one drachm of the resulting compound acts as energetically as two or three drachms of the ordinary powder.

The following is a more agreeable form than the preceding, and equally efficacious. Take half an ounce of carbonate of magnesia, and an ounce of each of the following substances, viz., sulphate of magnesia, bicarbonate of soda, tartrate of soda and potash, and tartaric acid. Expel all the water of crystallisation, and mix. This powder, if kept dry, effervesces when mixed with water, and one or two teaspoonfuls form the average dose. The addition of a drop of oil of lemon and a little powdered white sugar to each dose, makes this one of the most agreeable laxatives that can be prescribed.

SA'LISBURY, or **NEW SARUM,** the capital of Wiltshire, is an episcopal city, and a municipal and parliamentary borough, and stands in a fertile valley on the Avon, at the junction of that river with two of its affluents, 83 miles south-west of London by the South-western Railway, and 23 miles north-west of Southampton by a branch of the same. Its several parts are connected by three bridges. The town dates from 1220, in which year the cathedral was founded, and the inhabitants of Old Sarum, (see SARUM, OLD) two miles to the north, removed to S., attracted to the new site by the abundant supply of water. At the foundation of the town, the ground was divided into squares, or 'chequers' as they are called, to which the town is indebted for its appearance of airiness and regularity. The cathedral, the principal building of S., is one of the finest specimens of Early English in the country. It was begun in 1220, and was finished in 1258. The spire, which was added after the building was completed, is the 'most elegant in proportions and the loftiest in England.' Its height from the pavement is 400 feet, or 30 feet higher than St Paul's. The cathedral is 449 feet long; height in the interior, 81 feet; width of great transept, 203 feet. It is in the form of a double cross, is perfect in its plan and proportions, and in the main uniform in style. The west front

is still rich beautiful, and graceful, though now denuded of statues, upwards of 100 in number, with which it was once enriched S contains many schools and useful institutions The manufactures of cutlery and cloth for which it was once famous, have long declined and its trade is now chiefly in retail Pop (1861) 12 278 It returns two members to parliament

SALISBURY PLAIN, an extensive tract of undulating chalk country, in Wiltshire, between Salisbury and Devizes, about 20 miles long from north to south, and about 14 miles broad Its rolling surface resembles that of the ocean heaving after a storm On this plain, about 8 miles north of Salisbury, is Stonehenge (q v) Until within recent years, the expanse of S P remained in a state of nature and was covered with a fine turf which afforded pasture to sheep The natural features of the plain however, are now much changed North and south of Stonehenge wild slopes of thistle covered turf still extend but both east and west of it the country is laid out in cultivated fields, and within gun shot of the des late old r ... is a neat modern farm house

SALIVAHANA is the name of a Hindu prince who is said to have reigned in Magadha of South Behar He instituted an era which bears his name and the beginning of which took place when 3179 years of the Kali yuga or the present mundane age had expired, that is 78 years after the beginning of the Christian era This era is called Salivahana Saka, or simply Saka Thus 1865 of the Christian era would be tantamount to Saka (i e, in the Saka era) 1787 The Saka year is the same as, and begins with, the common solar year

SALIVARY GLANDS Under this name we designate three pairs of glands —the parotid, the submaxillary, and the sublingual, each gland having an efferent duct which conveys the glandular secretions into the mouth where when mixed with the mucus secreted by the follicles of the mucous membrane lining the mouth they constitute the ordinary or mixed saliva

The *Parotid Gland*, so called from the Greek



The Salivary Glands

1, the parotid gland 2, the submaxillary gland 3 the sublingual gland, 4 Steno s duct, 5, Wharton s duct 6 Bartholin s duct 7, masseter muscle, 8 mastoid process 9, digastric muscle 10 internal jugular vein, 11, external carotid artery, 12 the tongue

words *para*, near, and *ous*, the ear, is the largest of the three glands occurring on either side. It lies upon the side of the face immediately in front of the external ear, and weighs from half an ounce to an ounce Its duct is about two inches and a half in length and opens into the mouth by a small orifice opposite the second molar tooth of the upper jaw The walls of the duct are dense and somewhat thick, and the calibre is about that of a crow-quill

The *Submaxillary Gland* is situated, as its name implies, below the jawbone (part of which is cut away in the figure), and is placed at nearly equal distances from the parotid and sublingual glands. Its duct is about two inches in length, and opens by a narrow orifice on the top of a papilla, at the side of the *frænum* of the tongue

The *Sublingual Gland* is situated, as its name implies, under the tongue each gland lying on either side of the *frænum* of the tongue It has a number of excretory ducts, which open separately into the mouth

The minute structure of the parotid gland is described in the article GLAND and the other salivary glands are similarly constituted The salivary glands exist in all mammals, except the cetacea, in birds, and reptiles (including amphibians), but not in fishes, and glands discharging a similar function, occur in insects, many molluscs, &c The chemical and physical characters of the saliva are sufficiently described in the article DIGESTION

The most common disease of the parotid gland is a specific inflammation which has been already described in the article MUMPS The term *Parotid Tumours* is given to tumours of various kinds occurring in front of the ear and over the parotid gland With regard to surgical interference, Liston recommends that if there be reason to suspect that the disease is of a malignant nature and not thoroughly limited by a cellular cyst ... interference is admissible, if on the contrary it be ... all movable, has advanced slowly possesses a smooth surface, and is firm then an operation may be contemplated'

Certain functional diseases of the salivary glands require notice (of which the most important is that known as *Salivation* (q v) or *Ptyalism*, which consists in a much increased secretion of saliva *Deficient Secretion* is indicated by clamminess or dryness of the mouth and is common in low forms of fever It is important as indicating the condition of the system and still requires treatment If it should occur as an original affection, it must be treated by local Sialogogues (q v), such as liquorice, horse radish, pellitory &c *Alteration of the Saliva* is not unfrequent in disease For example it sometimes loses its alkaline character and becomes acid, as in acute rheumatism, diabetes &c , whilst in other cases it becomes so fœtid as to be a source of annoyance both to the patient and his friends as for example in scurvy, various forms of dyspepsia salivation & The undue acidity may be corrected by the administration of carbonate or bicarbonate of soda, while the fœtor may be relieved by attention to diet, and by the use, both local and general, of creosote, nitromuriatic acid, charcoal, chlorate of potash, &c

Ordinary Inflammation of these glands (distinct from mumps) may proceed from cold or local injury, but it is often produced by decayed teeth.

SALIVATION, or **PTYALISM** (from the Gr. *ptyalon*, the saliva), is the term employed to designate an abnormally abundant flow of saliva It most commonly arises from a specific form of inflammation of the parotid glands, induced by the action of mercury, in which case it is termed mercurial salivation, but it occasionally arises from the action of other drugs, especially iodide of potassium, and sometimes it occurs without any apparent cause,

in which case it is said to be *idiopathic* or spontaneous.

Mercury, in some form or other, is so common an ingredient in the quack medicines whose advertisements are unfortunately allowed to occupy a large space in many of our newspapers (especially in those medicines which are falsely stated to be of purely *vegetable origin*), that a popular knowledge of the most remarkable manifestations of this powerful mineral should be as widely diffused as possible. When this medicine is given in such a way as to excite salivation, a metallic taste in the mouth is soon recognised by the patient, and a remarkable but indescribable smell, known as the mercurial foetor, may be detected in his breath; the gums become swollen and spongy at their edges, and usually present a few slight ulcers, and an increased flow of saliva takes place, accompanied by pain in the teeth on pressure. If these symptoms be not checked (and *a fortiori* if more mercury be given), the tongue, cheeks, and throat swell and ulcerate, and the saliva that flows away amounts to several pints in the course of the day. This peculiar action of mercury varies extremely in different persons. Dr Watson, in his 14th Lecture, records several remarkable cases in which a single small dose of mercury produced the severest salivation. Cases of the opposite kind in which no impression on the gums or salivary glands can be made by the freest use of mercury, are by no means uncommon. It is worthy of notice that salivation is rarely produced in children below the age of ten years. Until a comparatively recent period, profuse salivation was deemed the only certain indication that the system was duly under the influence of mercury (and, indeed, it was believed that the cause of the disease was carried out of the body with the saliva), but now it is well known that all that is requisite is, that the gums should become distinctly tender, and that the mercurial foetor should be unmistakably present, and that these symptoms should be kept up for a certain time. Unfortunately, however, the physician cannot always stop the action of the mercury at that definite stage, and salivation to a distressing extent often occurs, even when the greatest care has been taken in the administration of the medicine. To check this excessive salivation the internal administration of chlorate of potash in scruple doses, three times a day, together with the frequent use of a gargle of the same salt, has been recommended by several high authorities. Dr Watson strongly advocates the use of a gargle composed of one part of brandy to four or five of water, and the application of moistened tannin to the gums; and when there is much external swelling, he applies eight or ten leeches beneath the edges of the jaw bones, followed by the application of a soft hot poultice to the neck.

It is worthy of notice that in the confluent form of small-pox, there is almost always more or less abundant salivation, which lasts for several days; and if it cease abruptly, the peril is usually great. Moreover, there is a more or less marked tendency to salivation in scurvy, hysteria, hydrophobia, some forms of mania, and not unfrequently in pregnancy.

Various cases of spontaneous salivation have been collected by Dr Watson in his 44th Lecture. In one instance of a girl ten years old, under his own care, no less than three pints of saliva were excreted in twelve hours. Medicine had no effect, but the salivation finally ceased spontaneously after a severe attack of influenza. In these cases, astringent washes, as a solution of alum, or the infusion of catechu, or a few drops of creosote, suspended by mucilage in water, are deserving of trial.

SA'LIX. See WILLOW.

SA'LLOW, the popular name of a number of species of Willow (q. v.), trees or low shrubs with downy branches, and generally ovate or obovate wrinkled leaves, having stipules. The GRAY S. (*Salix cinerea*) is one of the most common British species, growing in moist and swampy places. Other common species are the ROUND-EARED S. (*S. aurita*) and the GREAT ROUND-LEAVED S. (*S. caprea*), the latter remarkable for preferring a dry soil, and



Gray Sallow (*Salix cinerea*).

becoming a small tree, the wood of which is used for the handles of agricultural implements. The LONG-LEAVED S. (*S. acuminata*) differs from the other kinds in its lanceolate leaves. It is frequent in Britain. None of the sallows produce such long and slender twigs as the osiers, nor are they adapted for any but the coarsest wicker-work, and some of them are so apt to break that they cannot easily be used in that way. The shoots of two years' growth are split up and used for making hoops of barrels.



Sallow thorn (*Hippophae rhamnoides*):
a, Branch of the female plant, in fruit; *b*, branch of male plant, in flower.

SALLOW THORN (*Hippophae*), a genus of plants of the natural order *Elæagnaceæ*, consisting

of large shrubs or trees with gray silky foliage, and entire leaves. They have diœcious flowers: the perianth is tubular, becomes succulent, encloses an achenium, and forms an acid fruit. Few species are known: one only is European, *H. rhamnoides*, sometimes called the SEA BUCK-THORN, a large shrub or low tree, a native of the sandy sea-coasts of England and the continent of Europe. It is found also throughout great part of Tartary. It is sometimes planted to form hedges near the sea, growing luxuriantly where few shrubs will succeed. The berries are orange-coloured. They are gratefully acid. They are used for making a sauce in the south of France: a rob or jam is made of them on the shores of the Gulf of Bothnia, to impart flavour to fresh fish; and a preserve or jelly made from them is a favourite luxury of the Tartars. The *stellate* hairs of the underside of the leaf, covering it like scales, are a beautiful microscopic object.

SAL'LUST, CAIUS CRISPUS, a Roman historian, was born 86 B.C., at Amiternum, in the Sabine country. Though of a plebeian family, he rose to official distinction, first as quæstor about 59, and afterwards as tribune of the people in 52, when he joined the popular party against Milo, who in that year had killed Clodius. His reputation for morality was never high; and his illicit connection with Milo's wife is assigned as the cause of his being expelled in 50 from the senate, although his attachment to Cæsar's party is a more plausible reason of his expulsion. In the civil war, he joined the camp of Cæsar; and in 47, when Cæsar's fortune was in the ascendant, he was made prætor-elect, and was consequently restored to his former rank. When in Campania, at the head of some of Cæsar's troops, who were about to be thence transhipped to Africa, he nearly lost his life in a mutiny. In 46, however, we find him engaged in Cæsar's African campaign, at the close of which he was left as governor of Numidia. His administration was sullied by various acts of oppression, particularly by his enriching himself at the expense of the people. He was, for these offences, accused before Cæsar, but seems to have escaped being brought to trial. His immense fortune, so accumulated, enabled him to lay out those magnificent grounds, still known as the gardens of Sallust, on the Quirinal, to retire from the prevailing civil commotion into private life, and to devote his remaining years to those historical works on which his reputation rests. He died 31 B.C., four years before the battle of Actium. His histories, which seem to have been begun only after his return from Numidia, are: 1st, The *Catilina*, or *Bellum Catilinarium*, descriptive of Catiline's conspiracy in 63, during the consulship of Cicero; 2d, The *Jugurtha*, or *Bellum Jugurthinum*, commemorating the five years' war between the Romans and Jugurtha, the king of Numidia. These, the only genuine works of S. which have reached us entire, are of great but unequal merit. The quasi-philosophical reflections which are prefixed to them are of no value, but the histories themselves are powerful and animated, and contain effective speeches of his own composition, which he puts into the mouths of his chief characters. With its literary excellence, however, the value of the *Jugurtha* stops, as in military, geographical, and even chronological details, it is very inexact. His now lost work, *Historiarum Libri Quinque*, is believed to have described the events occurring between Sulla's death, 78 B.C., and the year of Cicero's prætorship, 66. The *Duæ Epistolæ de Republica Ordinanda*, and the *Declamatio in Ciceronem*, are of doubtful authenticity.

Apart from his literary qualities, which are rather those of an artificial than a natural writer, and which are not enhanced by his affectation of brevity, and his love of archaic expressions, S. has the merit of having been the first Roman who wrote what we now understand by 'history.' In official public life, he was more of a politician than a statesman, and the views which he supported were liberal, not so much because he loved the people, as because he hated the nobility. The best editions of his literary remains are those of Corte (Leip. 1724), Gerlach (Basel, 1823—1831), and Kritz (Leip. 1828—1834), which have each a special value.

SA'LLY-PORT, a gate or passage by which the garrison of a fortress may make a sally (through Fr. from Lat. *salio*, I leap or spring) or sudden attack on the besiegers. The name is applied to the postern leading from under the rampart into the ditch; but its more modern application is to a cutting through the glacis, by which a sally may be made from the covert-way. When not in use, sally-ports are closed by massive gates of timber and iron.

SALMASIUS, CLAUDIUS, the Latinised name of a celebrated French scholar, CLAUDE DE SAUMAISE, who was born at Semur, 15th April 1588. His father, Benigne de Saumaise, a man of superior erudition, was his first teacher. At the age of ten, young S. translated Pindar, and composed Greek and Latin verses. He studied philosophy at Paris, under the superintendence of Casaubon. From Paris he proceeded to Heidelberg, where he devoted himself to the science of jurisprudence, and publicly professed Protestantism, to which form of the Christian religion he had been secretly attached for many years. So insatiable at this time was his thirst for knowledge—book knowledge, at least—that he was wont to devote two whole nights out of three to hard reading, in consequence of which he brought himself to within an inch of the grave. In 1608, he published from MSS. two treatises of the sectary, Nilus, Archbishop of Thessalonica, and a work of the monk Barlaam on the primacy of the pope. In 1629, appeared his chief work, *Plinianæ Exercitationes in Caii Julii Solini Polyhistora* (2 vols., Par. 1629); after the publication of which, he set himself vigorously, and without the help of a master, to acquire a knowledge of Hebrew, Arabic, Coptic, and other oriental tongues. In 1631, he was called to Leyden, to occupy the chair that Joseph Scaliger had held there, and it is from this period that his European reputation as a scholar and critic dates. Various efforts were made (1635—1640) to induce S. to return to France, but he declined them on the ground that his spirit was too 'liberal' for his native land. Queen Christina of Sweden, however, managed to bring him to Stockholm, and fix him there for a year (1650—1651), after which he returned to Holland. He died of a fever caught by imprudently drinking the waters at Spa, 6th September 1658. S. was certainly a great scholar of the old-fashioned clumsy sort; but neither his wit nor his acumen was sufficiently keen to give an intellectual and critical value to his lucubrations; and though all his distinguished contemporaries, Casaubon, Gronovius, Grotius, Vossius, &c., deluged him with praise; though Balzac pronounced him *infallible*; though the curators of the university of Leyden declared that 'their university could no more do without Salmasius than the world without the sun;' though Queen Christina went the length of saying, with truly royal flattery, 'that she could not live without him'—he is remembered, not for his inexhaustible stores of erudition, his editions of the classics, or his treatises on classical antiquities, but for his controversy with John

Milton, scarcely his inferior in scholarship, and infinitely his superior in power of brain, and in all the arts of literary warfare The question at issue was the lawfulness of the execution of Charles I Apart altogether from the merits of the case, the great poet utterly overwhelmed his adversary, partly by the magnificence of his language and sentiments, and partly by the unscrupulous fury of his invective. S also is grossly abusive and acrimonious in his treatise (*Defensio Regia pro Carolo I*, 1649) *asinus* (ass), *pecus* (beast), and such like expressions being showered about quite freely, but he is deficient in logic, in real force of sarcasm, and in intellectual vigour generally

SA'LMON (*Salmo*), a genus of fishes of the family *Salmonidæ* (q v), which, as characterised by Cuvier, has teeth on the vomer both palatine bones, and all the maxillary bones, and includes numerous species more recently divided by Valenciennes into three genera, *Salmo Fario*, and *Salar*, the first characterised by a few teeth at the end of the vomer, the second, by a single line of teeth running down the vomer, the third by two rows of teeth on the vomer, without any remarkable group at its upper end To many naturalists, however this division seems too artificial and the characters, although excellent for distinguishing species not such as ought to divide genera, an opinion confirmed by the fact that the teeth are numerous along the vomer in the young of the species as the Common S, which finally retain only a group of them at the end The division made by Valenciennes separates the S, the Salmon Trout and the Gray or Bull Trout the only British species which ascend rivers from the sea into the two genera *Salmo* and *Fario*, whilst the Common Trout is referred to *Salar* A much more natural division, having regard to characters really conspicuous and important, and to the habits of the species is the simple one of Mr Pennell (*The Angler Naturalist* 1863) which is really nothing more than a formal recognition of groups practically recognised by every one acquainted with the fishes which compose them '1 The Silver or Migratory species (i e those migrating to and from the sea), 2 The Yellow or Non migratory species 3 The Charrs, or Orange and Red coloured species' The present article is devoted to the first of these groups The second is noticed in the article TROUT, the third in the article CHARR

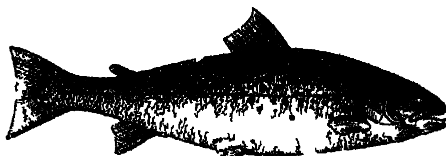
By far the most important of the three Salmonidæ which ascend the rivers of Britain from the sea is the SALMON (*Salmo salar*), in commercial importance far superior to any other fresh water fish, both on account of the abundance in which it is procured in the northern parts of the world, and of its rich and delicious flavour From ancient times it has furnished important supplies of food, and the S fisheries of Britain have long been a subject of anxious attention to the legislature Even rivers of Iceland now yield a rent, and are regularly netted for the supply of the British market to which the S are brought, as from other northern regions, fresh, in ice Many rivers and streams also, are rendered valuable by the S which periodically visit them, as affording sport to anglers with which nothing of the same kind is deemed worthy of comparison, and those of Norway, as well as those of Britain itself, are now frequented by British anglers.

The S is one of the largest species of the genus, having been known to attain the weight of 83 lbs, whilst S of 40 or 50 lbs, and even upwards, are occasionally brought to market Very large S, however, are not common, owing to the eagerness with which the fishery is prosecuted. No fish is more symmetrical or beautiful than the S, and its form is admirably adapted to rapid motion even against powerful currents, by the regular tapering from the front of the first dorsal fin both to the snout and to the tail, but more suddenly in the



Salmon (*Salmo salar*)

former direction by the nearly equal convexity of back and belly, and by the perfect smoothness and want of angularity The head is about one fifth of the whole length of the fish The under jaw of the male becomes hooked during the breeding season with a kind of cartilaginous excrescence, which is used as a weapon in the combats then frequent, wounds so severe being inflicted with it that death sometimes ensues The lateral line is nearly straight The scales are small, and the colour a rich bluish or greenish gray above, changing



Salmon Trout (*Salmo trutta*)

to silvery white beneath, sprinkled above the lateral line with rather large black spots The opercular bones shew a rounded outline at the hinder edge of the gill covers, which at once distinguishes this species from the only other British species that can be confounded with it the Salmon Trout and the Gray or Bull Trout The tail is forked in the young



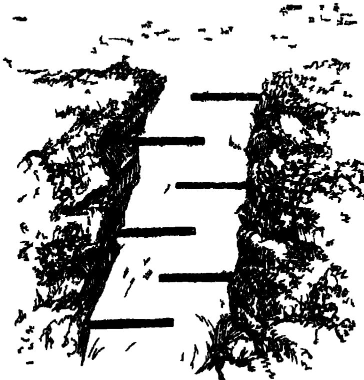
Gray, or Bull Trout (*Salmo eriox*)

S but becomes nearly square in the adult The mouth of the S is well furnished with teeth, a line of teeth on each side of the upper jaw, an inner line on the palatine bone, two or three in the adult state at the end of the vomer two rows on the tongue, and one row along the outer edge of each lower jaw bone This array of teeth indicates voracity, and the S seems to prey readily on almost any animal which it is capable of capturing, though it is a somewhat singular fact that the stomach when opened is rarely found to contain the remains of food of any kind, two or three herrings of full size have, however been found in its stomach, the sand launce and other small fishes seems to constitute part of its food, and when in fresh water, the minnow, trout fry or the fry of its own species, worms, flies, &c The angler catches S with the artificial fly, or with the minnow or the worm, and no bait is more deadly than the roe of the S. itself, the use of which is indeed prohibited in

British acts of parliament intended for the protection of the S. fisheries The eggs of crustaceans have also been found in the stomach of the S in such quantities as to shew that they form a very considerable part of its food

The S is found on the coasts of all the northern parts of the Atlantic, and in the rivers which fall into that ocean, as far south, at least, as the Loire on the European side, and the Hudson on the American Slight differences can be noted between the American and the European S, but they are not generally thought sufficient to distinguish them as species The S frequenting one river are indeed often characteristically different from those of another river of the same vicinity The S is not found in the Mediterranean nor in the Black Sea, nor in any of the rivers falling into them, and in the Arctic Ocean and its rivers as well as in the northern parts of the Pacific Ocean other species of the same genus take its place The preservation of S in a fresh state by means of ice being an invention of recent times this fish never appeared at the luxurious tables of ancient Rome except dried or salted, although its excellence was well known, the Romans having become acquainted with it in their northern conquests S is in perfection for the table only when newly taken from the water, whilst the fatty curd remains between the flakes of its flesh, which however begins to disappear within 12 hours although otherwise the fish is quite fresh Hence the peculiarly high value formerly ascribed in London to *Thames salmon*

The S, after it first migrates to the sea passes a great part of its life in it although under the necessity of periodically ascending rivers, in which the S that do not spawn or for other causes in autumn, often remain during most of the winter S return, in preference, to the same rivers in which they have passed the earliest part of their existence, as appears both from records of marked S, and from the characteristic differences already alluded to S ascend rivers to a great distance from the sea as the Rhine to the Falls of Schaffhausen, and the Elbe to Bohemia The speed with which they glide through the water in their most rapid movements is very great, it is said to be not less than 1500 feet in a minute or at the rate of 400 miles a day, but this, of course is sustained only for a few moments, and the ordinary rate of progress in ascending rivers is supposed to be from 10 to 25



Salmon Ladder

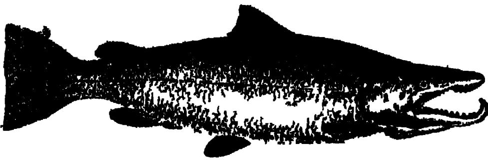
miles a day. The fish, also, almost always chooses to lie for a time in some spot, waiting a fresh flood in the stream. The perpendicular height which the S. can pass over by leaping, when there is abundance of water in the river and sufficient depth in the pool below the fall, seems to be not more than 12 or 14 feet, they attempt higher leaps, but often fall back exhausted, or fall on adjacent rocks, where they die or are captured They do, however, rush up steep and broken cataracts of much greater height. The ascent of many rivers by S. has been stopped by high weirs and other obstructions, but very simple and effectual means have been devised for preventing this by *fish-stairs* or *fish ladders*, which are often very conveniently formed by partitioning off a portion of the fall, and intersecting it from alternate sides, two thirds of its width, by transverse steps of wood or stone, so as partially to divide it into a succession of falls The S. soon find out the ladder, and leap up from one step to another By this, the interests of manufacturers and of fishery proprietors are in some measure reconciled.

As the time of spawning approaches, S undergo considerable changes of colour, besides the change of form already noticed in the snout of the male The former brilliancy of the hues gives place to a general duskiness, approaching to blackness in the females, much tinged with red in the males and the cheeks of the males become marked with orange stripes S in this state are 'foul fish,' being considered unfit for the table, and the killing of them is prohibited by British laws notwithstanding which however, multitudes are killed by poachers in some of the rivers, nor do those who eat them either fresh or 'kippered' (i e, dried) seem to suffer from any unwholesomeness, such as is sometimes alleged to belong to them, although they are greatly inferior in quality to S in other states S, which have completed their spawning, continue for some time, at least if in fresh water, very unfit for the table Their capture is prohibited by British laws They are called '*foul fish*' or more distinctively, '*spent fish*' or *Kelts* the males are also called *Kippers*, *kip* being a name for the cartilaginous hook of the under jaw, and the females *Shedders* or *Baggits* Such names, originally local, have become of more general use from having been introduced into acts of parliament The name *Kelt*, in particular is now very commonly employed When they remain for a considerable time in fresh water after spawning, kelts recover very much, and increase in weight, whereas, before spawning, there is a diminution of weight 'A well mended kelt' approaches in quality to a good or 'clean' S, although far from being equal to it

The time of spawning is from the end of autumn to the beginning of spring, or even the beginning of summer, differing considerably in different rivers, whilst in each river it is prolonged throughout months, the elder and stronger fish of the former year probably ascending to spawn first The difference of season in different rivers is probably to be accounted for by the temperature of the water, as affected by latitude, and by the relations of the river to lakes, to low warm plains, and to snow covered mountains

S spawn on beds of fine gravel, in shallow parts of rivers, such as are used for the same purpose by trout Some beds of this kind, in salmon-frequented rivers, have been notable from time immemorial as favourite spawning places, and large numbers of fish, both the S and its congeners, deposit their spawn in them every year The spawning female approaches the bed, attended by at least one male fish, sometimes by more than one, in which case fierce combats ensue, she makes a furrow in the gravel with her tail, and deposits her spawn in it, on which the male afterwards pours the vivifying melt. It was formerly believed that the furrow

was in part made by the snout of the fish, and to this the snout of the male at the spawning season was supposed to be particularly adapted, but it has been found by observation that the snout is not



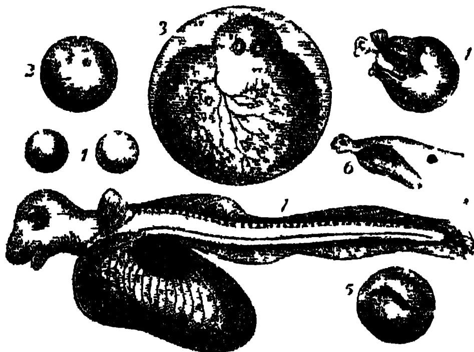
Old Male Fish, or Kipper, during the Spawning season.

used in this work The eggs, when deposited and vivified, are covered by the action of the tail of the female, the male doing nothing but depositing his melt, and fighting with any other of his sex that may attempt to dispute his place

The time occupied by a female S. in spawning is from three to twelve days After spawning, the S. generally soon descends to the sea The descending *kelts* are very ravenous and therefore a great annoyance to anglers who desire to take none but *clean* fish and must return the kelts to the water

The eggs deposited in the spawning bed are liable to be devoured by trouts and other fishes which are ever ready and by insect larvæ of many kinds, which work their way even through the gravel, ducks and other waterfowl also search there for their food and sometimes a flood changes the bed so much as either to sweep away the eggs, or to overlay them with gravel to a depth where they are never hatched, or from which the young can never emerge The number of eggs hatched in ordinary circumstances must be small in proportion to the number deposited, and by far the greater part of the fry perish before the time of descent to the sea

In from thirty to sixty days after the deposition



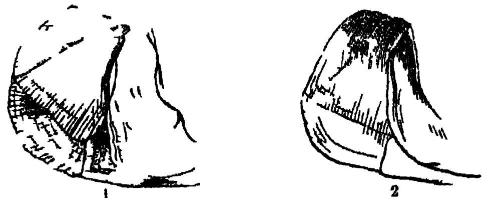
Salmon Ova, and Newly Hatched Fish

(Copied from the *Field* newspaper)

1, egg of salmon, natural size just taken from the parent fish, 2, the same, with the eyes of the young fish just becoming apparent, this takes place about the thirtieth or thirty fifth day, according to the temperature 3, the young fish coiled up in the egg, and just ready to be hatched, 4, the young fish emerging from the shell, 5 the empty egg shell shewing longitudinal rent made by the young fish, 6, young salmon about two days old natural size 7 the young salmon (about two days old, magnified the umbilical vesicle, containing the yolk and the oil globules, and blood vessels ramified on its surface, also the head, with the huge eyes and badly-developed mouth (a portrait), the fins and the thin transparent body, the fins not as yet being developed into their proper shape, are carefully delineated

of the eggs in the spawning bed, they begin to shew signs of life, and the eyes appear as small specks. The time which elapses before the egg is hatched varies according to the temperature of the water, and therefore is generally shorter in England than in Scotland, 140 days being sometimes requisite in cold climates and late springs; whilst it has been found that in a constant temperature of 44° F sixty days are enough, and in a higher temperature eggs have been hatched even in thirty days A temperature above 70° F is, however, fatal to them. S. eggs are easily hatched in an aquarium, in which proper care is taken to prevent stagnation of the water, so that the conditions may resemble those of a bed of gravel in a running stream, and many interesting observations have thus been made by Mr Frank Buckland on the development of the young S., of which the results have from time to time been given to the world through the columns of the *Field* newspaper and his excellent work on *Fish Hatching* *

The young fish lies coiled up in the egg which it finally bursts in its struggles to be free, and it issues with a conical bag (umbilical vesicle) suspended under the belly, containing the yolk of the egg and oil globules, which afford it nourishment during the first five or six weeks The mouth is at first very imperfectly developed, as are the fins, and the whole body has a shape very different from what it is soon to assume, and is very delicate and almost transparent The slightest injury is fatal The length, at first, is about five eighths of an inch About the seventh or eighth week, the



Gill covers of Salmon (1) and Salmon Trout (2)

young S. has changed into a well formed little fish about an inch long with forked tail, the colour light brown, with nine or ten transverse dusky bars, which are also more or less distinctly visible in the young of other species of this genus, just as the young of many feline animals exhibit stripes or spots which disappear in their mature state The fry, previously very inactive, now begin to swim about, and seek food with great activity, and are known as PARR, or SAMLET, and also in some places by the names *Pink*, *Brandling*, and *Fingerling* The Parr was formerly supposed to be a distinct species (*S. salmulus*), an opinion to which many anglers, eager to enjoy their summer holidays, and catching parr by scores with the artificial fly or worm when they can catch nothing else, have clung tenaciously, after it has been shewn to the satisfaction of all naturalists that the parr is nothing else than the young salmon The honour of proving this belongs to Mr Shaw, of Drumlanrig, Dumfriesshire, whose observations and experiments, first made in 1834—1836, we have not space to detail. They have, however, been fully confirmed at the salmon-breeding ponds of Stormontfield, on the Tay.

Gill covers of Bull Trout

* London: Tinsley Brothers 1863.

It was long urged, to prove the parr a distinct species, that the male parr is very often found with the milt perfect, to which, however, it was replied that the female parr is almost never found with perfect roe. But the remarkable fact has now been abundantly proved that the male parr is capable of impregnating the roe of the female S., and thus a provision seems to be made in nature to prevent an otherwise possible loss of roe. And, indeed, ridiculous little parrs seem to be always ready at hand to perform this service during the combats of the great fish, or in their absence. Another remarkable fact has been discovered, that some parrs descend to the sea in their first year, whilst others remain in the fresh water, and in the parr state, without much increase of size for another year, and a few even to the third year. At Stormontfield it has been found that about one half of the parrs migrate when a year old. No reason can be assigned for these things; the facts alone are known to us, and have but recently been established.

The parr attains a size of from 3½ to 8 inches. When the time of its migration comes, usually in May or June, it assumes brilliant silvery hues, the fins also becoming darker, and is then known as a *Smolt*. Groups of smolts, 40 to 70 in a group, now descend, not very rapidly, to the sea. They remain for a short time in brackish water, and then depart from the estuary. Of their life in the sea nothing is known, except that they increase in size with wonderful rapidity; for it has been found that smolts which had been marked, returned to the same river in six or eight weeks as *Grilse* of three to five pounds, or, after a longer period, even of eight or nine pounds. Some reascend the rivers when only a pound and a half or two pounds weight, and these are in some places known as *Salmon Peal*. Grilse are captured in great numbers in the latter part of summer and in autumn, but very few are seen in the earlier part of the fishing season. The grilse usually spawns on its first return to the fresh water—often remaining there for the winter, and on again descending to the sea assumes the perfect characters of the mature salmon. Little increase of size ever takes place in fresh water; but the growth of the S. in the sea is marvellously rapid, not only on its first migration, but afterwards. A kelt caught by the late Duke of Athole on 31st March weighed exactly ten pounds. It was marked, and returned to the Tay, in the lower part of which it was again caught, after five weeks and two days, when it was found to weigh twenty pounds and a quarter.

The statistics of S. fisheries are, like those of other fisheries, very imperfect. It is impossible to ascertain the total annual value of the S. fisheries even of Great Britain and Ireland; but it must be reckoned by hundreds of thousands of pounds. 'From the Reports of the Irish Commissioners, we learn that, in 1862, apparently an ordinary year, three Irish railways conveyed 400 tons, or about 900,000 lbs. of salmon, being equal in weight and treble in value to 15,000 sheep, or 20,000 mixed sheep and lambs. In Scotland, the Tay alone furnishes about 800,000 lbs., being equal in weight and treble in value to 18,000 sheep [and lambs]. The weight of salmon produced by the Spey is equal to the weight of mutton annually yielded to the butcher by each of several of the smaller counties. The diminution in the supply of food caused by the decay of the Tweed fisheries is about 200,000 lbs. a year. And in making comparisons between the supplies of fish and of flesh, it must be kept in mind that fish, or at least salmon, though higher in money-value, cost nothing for their keep, make bare no pasture, hollow out no turnips, consume no corn, but are, as Franklin expressed it, "bits of silver pulled out of the water."'—(Russel, *The Salmon*, p. 12.) The other British species yet to be noticed in this article, are reckoned with the S. itself in all that relates to S. fisheries.

The S. fisheries of the British rivers have in general much decreased in productiveness since the beginning of the present century, which is very much ascribed to the introduction of fixed or standing nets along the coast, by which S. are taken in great numbers before they reach the mouths of the rivers to which they are proceeding, and in which alone they were formerly caught; it having been discovered that S. feel their way, as it were, close along the shore for many miles towards the mouth of a river, feeding, meanwhile, on sand-launces, sand-hoppers, and other such prey. It is also partly owing to the destruction of spawning fish by poachers; and in no small measure to the pollution of rivers consequent on the increase of population and industry, and to the more thorough drainage of land, the result of which has been that rivers are for a comparatively small number of days in the year in that half-flooded condition in which S. are most ready to ascend them. The last of these causes is the most irremediable; but if the operation of the others were abated, it would not of itself be sufficient to prevent a productiveness of our rivers much greater than the present. The efforts which have begun to be made by breeding-ponds (see PISCICULTURE) to preserve eggs and fry from destruction, and so to multiply far beyond the natural amount the young S. ready to descend to the sea, promise also such results as may yet probably make the supply of S. *far* more abundant than it has ever been. There is reason to think that the productiveness of the waters may be increased as much as that of the land.

The stake net is the most deadly of all means employed for taking S.; and its use is prohibited in estuaries and on some other parts of the coast. It consists of two rows of net-covered stakes so placed between high and low water marks, that S. coming up to them, and proceeding along them, are conducted through a narrow opening into what is called the *court* of the net, from which they cannot find the way of escape. The *cruive*, which is now illegal in all parts of Britain, is an enclosed space formed in the wall of a dam or weir, into which the S. enter as they ascend the stream, whilst a peculiar kind of grating prevents their return. The nets employed for catching S. in rivers and estuaries are of many different kinds. In many places a small boat, or *salmon coble*, is used to carry out a seine net from the shore, setting (*shooting*) it with a circular sweep, the concavity of which is towards the stream or tide, and men stationed on shore pull ropes so as to bring it in by both ends at once with whatever it may have enclosed. Coracles (small boats of basket-work or a light wooden frame covered with canvas and tar, or other waterproof material) are used in S. fishing in the Severn and other Welsh rivers. Nets which a single man can carry and work are also used in many rivers and estuaries, as those called *halves* on the Solway, which may be described as a bag attached to a pole. Dogs have sometimes been trained to drive S. into nets, and some dogs have attained great expertness in catching S. without any assistance.

The SALMON TROUT (*S. trutta*, or *Fario argenteus*), also very commonly called the SEA TROUT, is rather thicker in proportion to its length than a S. of the same size, and has the hinder free margin of the gill-cover less rounded. The jaws are nearly equal; the teeth strong, sharp, and curved, a single row running down the vomer, and pointing alternately in opposite

directions. The colours are very similar to those of the S.; the sides, chiefly above the lateral line, are marked with numerous X-shaped dusky spots, and there are several round dusky spots on the gill-covers. The salmon trout does not attain so large a size as the S., but has been known to reach 24½ lbs. The flesh is pink, richly flavoured, and much esteemed, although not equal to that of the salmon. Great quantities of salmon trout are brought to market in London and other British towns; this fish being found from the south of England to the north of Scotland, and plentiful in many rivers, particularly those of Scotland. Its habits are generally similar to those of the salmon. Large shoals sometimes congregate near the mouth of a river which they are about to enter, and sometimes afford excellent sport to the angler in a bay or estuary, rising readily to the fly. The young are not easily to be distinguished from parr. *Phinock*, *Hirling*, and *Whitling* are local names of the salmon trout on its first return from the sea to fresh water, when it has its most silvery appearance, in which state it has sometimes been described as a distinct species (*S. albus*).

The GRAY TROUT or BULL TROUT (*S. eriox*), the only other British species migrating like these, is already noticed in the article BULL TROUT. The gill-cover in this species is more elongated backwards at the lower angle than in the other two. On the banks of the Tweed and some other rivers, it is often called the sea trout, a name quite as appropriate to it as to the salmon trout. The seasons at which the gray trout ascends rivers are partly the same with those of the S. and salmon trout, and partly different. The laws relative to the fishing of S. apply equally to the bull trout.

Of other species of S. our notice must be very brief. Cuvier has described as a distinct species a S. with hooked lower jaw, known in France by the name of *Becard*. Agassiz and Bloch regard it as merely the old male of the Common Salmon. The hooked lower jaw of the male of the Common S. in the spawning season has been already noticed. But Valenciennes adheres to the opinion of Cuvier that the *Becard* is a distinct species, and insists on the greater length of the intermaxillary bones as a sure distinctive character; asserting also that the colours are always different from those of the common S.; a general reddish-gray, the belly dull white, the back never blue, nor the belly silvery. The subject seems to require further investigation.—The HUCHO of the Danube, called *Reo* in Galicia (*S. Hucho*), attains a weight of 30 lbs., and it is said even of 60 lbs. The body is longer and rounder, the head more elongated than in the Common Salmon. The colour is grayish-black, tinged with violet on the back, the sides and belly silvery. The tail is forked. The hucho spawns in June, making holes for the purpose in gravelly bottoms; and these holes are so deep that the fish lying in them often escape the nets of the fishermen. The flesh is white, but very pleasant. The same, or a very similar species, is found in the Caspian Sea, and in rivers which flow into it.—The rivers of North America which flow into the Arctic Ocean, produce several species of S., of which perhaps that most nearly resembling the Common S., in the quality of its flesh, is *S. Hearnii*. In these regions, Ross's *S.* (*S. Rossii* or *Fario Rossii*) is extremely abundant. It is of a more slender form than the S., with remarkably long lower jaw and truncated snout; the scales separated by naked skin; the back greenish-brown, the sides pearl-gray, the belly orange or red. In the quality of its flesh it is very inferior to the salmon. —*S. Scouleri*, or *Salar Scouleri*, ascends the Columbia and other rivers of the north-west coast of North America in vast multitudes. In arms of the sea on that coast it is sometimes impossible for a stone to reach the bottom without touching several; and the channel of a river or a brook is often densely crowded with them. The flesh is excellent. The same species seems to ascend the rivers of Kamtchatka; but that country, the Kurile Isles, and Siberia have also species of their own. Concerning many of the species which have been named and partially described, there is still, however, great uncertainty.

ANGLING FOR SALMON.—The capture of the salmon by rod and line affords the most exciting sport of the kind. The pleasures of it have been descanted on by numerous writers, and whole treatises have been written on the minutiæ of the art. Among the more modern writers on the subject, we may name Davy, Stoddart, Colquhoun, Younger, Stewart, Francis, and Russel. The tackle used is sufficiently described in the article ANGLING; and the general principles of fly-fishing there laid down are applicable in this case. The chief specialty in salmon angling is to be able to maintain perfect coolness and vigilance when the fish is hooked. The rod must be kept at such an elevation as to bring its elasticity into play; and by allowing the line to run out as the fish dashes off, and winding it up as he returns, or by following his motions, if need be, in person, a constant and equal strain must be maintained; a sudden tug at an unyielding line, or a momentary slackening, being equally fatal. After struggling for from a quarter to half an hour (sometimes, though rarely, for two or three hours) against a steady pull, the fish generally yields to his fate and allows himself to be drawn into the shallow and landed. This is done either with the gaff; or the fisher, winding his line up within rod length and holding the top landwards, without slackening, seizes the fish with one hand by the root of the tail, and lifts, or rather slides him head-foremost on to the gravel or grass.

Those rivers of Britain where the fishing is strictly preserved, still afford good sport; but of late years the take of fish, by rod as well as by net, has greatly fallen off, and many fishers now betake themselves annually to the rivers of Norway and Sweden. In Scotland the Tay, Tweed, Don, Spey, Dee, Thurso, and some others are still preserved in many places, and command high rents from salmon anglers.

SALMON-FISHERY LAWS.—Owing to the peculiar excellence of the salmon, it is singled out from all other fish, and protected by peculiar laws in the United Kingdom, but those laws are not the same in the three kingdoms. I. As to England.—The right to fish salmon in the sea and navigable rivers belongs to the public as a general rule; and the right to fish salmon in rivers not navigable belongs to the riparian owner on each bank, the right of each extending up to the centre line of the stream. But though the public have, as a rule, the right to fish in the sea and navigable rivers, there are various exceptions, which arose in this way. Previous to Magna Charta, the crown, whether rightly or wrongly, assumed power to make grants to individuals—generally the large proprietors of lands adjacent—whereby an exclusive right was given to such individuals to fish for the salmon as well as all other fish within certain limits. This right, when conferred, often applied to the shores of the sea, but generally prevailed in navigable rivers and the mouths of such rivers. The frequency of such grants was one of the grievances redressed by Magna Charta, which prohibited the crown thenceforth from making like grants. But the then existing grants were saved, and hence every person who at the present day claims a several or exclusive

fishery in navigable rivers, must shew that his grant is from the crown, and is as old as Magna Charta. It is not, however, absolutely necessary that he be able to produce a grant or claim of grants of such antiquity; for if he has been in undisturbed possession for a long time—say thirty years and upwards—it is presumed that such title is as old as Magna Charta, and had a legal origin. When a person is entitled to a salmon fishery (and if he is entitled to a salmon fishery he is entitled also to the trout and other fish frequenting the same place), he is nevertheless subjected to certain restrictions as to the mode of fishing salmon. These restrictions are imposed by the Salmon Fishery Act, 24 and 25 Vict. c. 109 (1861), which repealed prior acts of parliament. No person is now entitled to use lights, spears, gaffs, strokeballs, snatches, or other like instruments for catching salmon; nor can fish roe be used for the purpose of fishing. All nets used for fishing salmon must have a mesh not less than two inches in extension from knot to knot, or eight inches measured round each mesh when wet. No new fixed engine of any description is to be used. A penalty is incurred for violating these enactments, and also for taking unseasonable salmon, or for taking, destroying, or obstructing the passage of young salmon, or disturbing spawning salmon. The close time, during which no salmon shall be fished, extends from 1st September to the 1st February following, except that for rod fishing the close season shall not commence till 1st November. These periods may, however, be slightly varied for each locality. During close time no salmon can be legally sold or be in the possession of any person for sale; and such fixed engines as are still legal shall be removed or put out of gear during close time. Moreover, throughout the year, there is a weekly close time—that is to say, no person can, except with rod and line, lawfully fish salmon between 12 A.M. (noon) of Saturday to 6 A.M. of Monday following. In all dams fish-passes must be attached by the proprietors, and free gaps made in fishing weirs of a certain width. For the purpose of supervising the enforcement of the act, fishery inspectors are appointed for England, and powers of assessing proprietors in each district were conferred by a statute of 1865 in imitation of the Irish acts. As to poachers of salmon, see POACHING.

II. In Scotland, there are various important differences from the law of England as regards salmon fisheries. In Scotland, the general rule is that all salmon fisheries in the rivers and surrounding seas, are vested in the crown, and hence no person is entitled to fish with nets or engines except he can shew a grant or charter from the crown. If he can only shew a general grant of fishings without specifying salmon, then it is necessary not only to produce such grant, but to shew that he has been in exclusive possession for forty years and upwards of the salmon fishings. Though, however, this right to catch salmon by nets is vested in the crown, or in some grantee of the crown, the right to angle for salmon is not derived from the crown, but belongs to the riparian owner, who may angle for salmon so far as his doing so does not prejudice the net fishing, and it can seldom do so. By virtue of many old statutes, all fixed engines for catching salmon are illegal, and it is settled that everything is in the nature of a fixed engine which is not held in the hand of the fishermen while they are fishing; but a mechanical contrivance, which enables the fisherman to go a little further into the river with his coble or boat, which is to drag the net, is not illegal. Stake nets, however, are not illegal if they are not in a river or the mouth of a river. In 1862 a statute, 24 and 25 Vict. c. 97, passed for regulating the Scotch salmon fisheries. By this act fishery districts are constituted under the management of boards. These boards consist of the large proprietors of fisheries. The boards appoint constables, water-bailiffs, and watchers, forming a kind of river police. The board has power to assess the various proprietors in sums so as to raise funds for paying the expenses of working the act—a power which was not given by the English acts till 1865. The annual close time for salmon fishing is fixed by the commissioners, and varies in each district, but it generally extends from 27th August to 10th February following; the angler's close time commencing about 16th October. The commissioners are appointed by the Home Secretary, their duties being to fix the limits of fishery districts and of rivers, to make general regulations as to close time, cruives, nets, &c. The Scotch act imitates the English act in prohibiting fishing with lights or salmon roe, with nets having small meshes, selling fish during close time, &c. And there is a weekly close time from 6 P.M. on Saturday to 6 A.M. on Monday following.

III. Ireland.—The Irish salmon fishery laws are regulated chiefly by statutes distinct from those of England. Fishery districts are there established, and the fisheries are subject to rates and licence duties for the purpose of raising funds. There is an annual and weekly close time, and fixed engines are prohibited, and free gaps enforced in all fishing weirs.

SALMO'NIDÆ, a very large and important family of malacopterous fishes, of the suborder *Abdominales* (having the ventral fins on the abdomen, and behind the pectorals), nearly allied to *Clupeidæ* (the Herring family), but at once distinguished by the second dorsal fin, which they all have, and which is merely a fold of the skin, enclosing fat, whence it is called the *adipose fin*, and destitute of rays. They were all included by Linnæus in the genus *Salmo*, although now divided not only into numerous genera, but by many naturalists into several families, of which one retains the name of S., and the other principal ones are *Characinidæ* and *Scopelidæ*. The S. are generally very muscular, and possess great strength, swimming with great rapidity, even against strong currents, and some of them are capable of leaping up falls of considerable height, when there is sufficient depth of water beneath. Some of them are sea-fishes, never entering rivers, although, like the herring, pilchard, &c., they approach the shore to spawn; others are generally inhabitants of the sea, but ascend rivers to spawn, and some of them also on other occasions not yet well understood; others, again, are constant inhabitants of fresh-water lakes, or of rivers and streams. Most of them are esteemed for the table, and some are among the most esteemed of fishes.

The restricted S. of those naturalists who divide the family, are all scaly fishes, but with the head destitute of scales, and the cheeks fleshy; the upper part of the mouth is formed by the premaxillary and maxillary bones together; the branchiostegal rays are numerous; the air-bladder is large and simple; the teeth are usually small, sometimes very numerous, the tongue being furnished with them, as well as the other parts of the mouth, although others have the teeth few and small, or even wanting. They are generally voracious fishes, feeding chiefly on other fishes, crustaceans, worms, &c. The Salmon, Salmon Trout, Bull Trout or Gray Trout, Trout, Charr, Grayling, and Smelt, are familiar British examples. The White Fish of North America is one of the most important species, and to the same genus (*Coregonus*) belong many others, inhabiting the lakes and rivers of the northern parts

of the world, some of them, from their herring-like appearance, known as *Herring-salmon* and *Fresh-water Herring*. The Capelin (q. v.) is a sea-fish, never entering fresh waters. The restricted or true S. are found only in the northern parts of the world, and chiefly in the colder regions.

The *Characinidæ* also have the body scaly, and the head destitute of scales; the upper part of the mouth is formed by the premaxillaries and maxillaries together; there are only four or five branchiostegal rays; the air-bladder is divided by a constriction in the middle; the teeth are very various, wholly wanting in a few, numerous in most of the genera, present on the tongue in some, and not in others; small and feeble in some, in others large and strong; in many conical and sharp, in some flat. Most of the species feed on animal food, but a few on vegetable food alone; whilst some are omnivorous, eating with equal readiness worms or other soft animals and fruits which fall into the water. One of those feeding exclusively on vegetable substances is the Pacu (*Myletes Pacu*), a fish scarcely excelled by any as an article of food, which has teeth very like the molar teeth of sheep, and employs them in browsing on the plants that grow on rocks covered with water, near the cataracts of the rivers of Guiana, and in some of the tributaries of the Amazon. In form, it is very unlike the trout or salmon, being short, thick, and clumsy. This, however, is not unfrequent in the *Characinidæ*, which exhibit much greater variety of form than the S. proper. Thus, in some of the genus *Serrasalmo* (see PIRAYA), of which there are many species, voracious carnivorous fishes with sharp trenchant teeth, the depth of the body is almost as great as its length. The species of *Serrasalmo* are sometimes called *Saw-bellied Salmon*, from their keeled and serrated belly. The *Characinidæ* are all inhabitants of fresh waters; some of them African, but the greater number South American. Their flesh is generally much esteemed.

The *Scopelidæ* differ from both the previous sections of S. in the structure of the mouth, which is formed entirely of the premaxillary bone, the maxillary lying behind. Few of them have an air-bladder. Some are scaly, and some destitute of scales. The form of the body is salmon-like in some, but deep and compressed in others. They are generally marine, as the Argentine (q. v.) the only British species. They abound chiefly in the warmer seas; the Mediterranean produces some; but the greater number belong to the Chinese and East Indian seas. Some are in high repute for their fine flavour.

Australia produces none of the Salmonidæ. The rivers and streams of that region, however, as well as those of New Zealand, Patagonia, and the Falkland Islands, produce a number of species of *Galaxias*, a genus of very trout-like form, but with no scales and no adipose fin. They are called *trouts* by the colonists in Australia and New Zealand, but are of very inferior quality for the table.

SALOMON, JOHANN PETER, an eminent musician, violin-player, and composer, born at Bonn in 1745. When young, he was attached to the service of Prince Henry of Prussia, for whom he composed several operas. In 1781, he visited Paris, and afterwards London, where he met with so warm a reception, that he was induced to settle there. His series of subscription concerts in London, in 1790, form an era in the history of music, in so far as they led to the production of Haydn's twelve grandest symphonies, known as the Salomon set. In 1800, S. retired from public life, but continued to compose songs, glees, and violin solos and concertos. He died in 1815, and was interred in Westminster Abbey.

SALONI'KI (anc. *Thessalonica*, Turk. *Selanik*), a town of European Turkey, in the eyalet of the same name, and, next to Constantinople, the greatest emporium of commerce in the empire, is situated on the Gulf of Saloniki, and rises from the shore along the face of a hill. The city is enclosed by white walls, partly ancient and partly medieval, about five miles in circuit, and is surrounded by cypresses and other evergreens. As seen from the sea, it presents a bright and beautiful appearance; but its internal aspect is miserable in the extreme. The principal buildings are mosques, most of which were previously Christian churches. The *Citadel*, called by the Turks Yedi-Kuleh, or 'the Seven Towers,' is the ancient Acropolis; within it are to be seen the ruins of a triumphal arch belonging to the time of Marcus Aurelius. Other relics of antiquity are the Propylæum of the Hippodrome, a magnificent Corinthian colonnade of five pillars; the triumphal arch of Augustus, erected after the battle of Philippi (now forming the gate of Vardar or Vardari), the arch of Constantine, &c. S. exports the corn, cotton, wool, tobacco, bees-wax, and silk of Macedonia. In 1856, the value of the exports was more than £1,350,000, and that of the imports more than £1,000,000. Pop. 70,000, of whom 30,000 are Turks, 20,000 Greeks, and 20,000 Jews. There is regular steamboat communication with Constantinople.

S. was at first called Therma, under which designation it is mentioned in connection with the march of Xerxes through Greece. It was rebuilt by Cassander about 315 B.C., who probably named it Thessalonica in honour of his wife; and during the Roman-Macedonian Wars, it figures as the principal station of the Macedonian fleet. After the close of the civil wars, its prosperity rapidly increased, and for three centuries it was the first city in Greece. It was early the seat of a Christian church. During the barbarian invasions, it proved the great bulwark of the Eastern empire. It was thrice taken in the middle ages—first, by the Saracens in 904; secondly, by the Sicilian Normans in 1185; and thirdly, by the Turks under Amurath II. in 1430.

SALOO'P. See SASSAFRAS.

SA'LOP. See SHROPSHIRE.

SA'LPA, a genus of Mollusca, of the division *Tunicata*, in which there is no shell, but a leathery tunic with two apertures; the type of the family *Salpidæ*, which float in the sea, and have the tunic transparent and elongated. They are allied to *Ascidia* (q. v.), although not fixed like them, and have two openings, through the hinder of which the water enters, and is expelled through the anterior by a regular contraction of the mantle, so that the animal is impelled through the water in a backward direction, without any apparent voluntary action. The *Salpæ* are sometimes solitary, and sometimes united in long chains, those in chains having the contractions of the individuals simultaneous; but the solitary *Salpæ* appear to be the parents of those which are in chains, and they in turn give birth to solitary individuals very different from themselves. The whole texture is very delicate, so that the animal is sometimes scarcely to be discerned, except from its iridescent hues in the sunshine, which make chains of *Salpæ*, when very numerous, a conspicuous feature in the surface of the great deep in tropical regions. The orifices of the alimentary canal are not near together, as in *Ascidia*, but at opposite extremities of the body. The branchial chamber of *Ascidia* is represented by a wide membranous canal, traversed by a long vascular ribbon, which is continually exposed to the

water that passes through the canal. The *Salpæ* united in chains have no organic connection, but apparently adhere together by little suckers.

SAL PRUNELLE. See NITRE.

SA'LSAFY, or **SALSIFY** (*Tragopogon porrifolius*), a biennial plant growing in meadows throughout Europe, not common, and perhaps not truly indigenous in Britain; cultivated in gardens for the sake of its root, which is used in the same manner as the carrot, and is very delicate and pleasant,



Salsafy (*Tragopogon porrifolius*).

with a flavour resembling asparagus or scorzonera. The root is long and tapering, and in cultivation white and fleshy, with much white milky juice; the stem 3—4 feet high, with smooth and glaucous leaves, which resemble those of the leek; the flowers are of a dull purple colour. The seed of S. is sown in spring, and the root is ready for use in winter. In the following spring, when the flower-stalks are thrown up, they are used like asparagus. Owing to a peculiar mode in which the roots are sometimes dressed, so as to have a flavour somewhat like that of oysters, S. is sometimes popularly called the *Oyster Plant*.—The genus *Tragopogon* belongs to the natural order *Compositæ*, suborder *Cichoraceæ*, and is distinguished by one row of 8—10 bracts united at the base, a punctured receptacle, feathery pappus, and striated achenia with long beak.—The PURPLE GOAT'S BEARD (*T. pratensis*), a native of Britain, was formerly cultivated in England for its roots, which are similar in quality to salsafy.

SALSE'TTÉ (native name *Sáshti*), an island on the west coast of British India, in the presidency of Bombay, lies immediately north of Bombay, with which it is connected by a long peninsula, and by an artificial embankment called Zion's Causeway. It is 18 miles long, and 11 miles in extreme breadth. Pop. about 50,000. It is beautiful, picturesque, and densely wooded, is diversified by mountain and hill, and contains many fertile tracts. Sugar, indigo, cotton, flax, and hemp are grown. Thanah, the chief town, stands on the east coast, 20 miles north-north-west of Bombay by the Great Indian Peninsular Railway, which, after traversing the islands of Bombay and S., crosses to the continent half a mile to the south of this town. Pop. about 12,000. A number of remarkable caves, called the Caves of Kánhari or Kenery, are found in the middle of the island, five miles west of Thanah. They are nearly a hundred in number, are all excavated in the face of a single hill, and contain elaborate carving. The caves are in six stories, on the ledges of the mountain, and the stories are connected by stairs cut in the rock. The cave first approached consists of three chambers, one unfinished, and dates from the 9th or 10th C. A.D; it contains no figures or carvings. The other caves contain numerous carved representations of Buddha, many of them of colossal size. Relics and inscriptions are also found. There are caves in several localities of the island, besides those at Kánhari—e. g., those of Montpezir, Magatani, and Jageshwar. The caves are frequently the haunts of serpents and tigers. On the north, on the coast, is the small watering-place of Ghorb Bandar, which has been designated the Montpelier of Bombay. The fort of Thanah and the island of S. were taken by the English in 1774.

SALT, MANUFACTURE OF. See SODIUM. Common salt is either procured in the solid crystalline state, called *Rock-salt* (q. v.), as a natural brine from wells or springs, or by the evaporation of sea-water. In the first case, it is obtained by mining, often at great depths, as at Northwich in Cheshire; at Salzburg, Magdeburg, Berchtesgaden, and Wimpfen in Germany; Cracow in Poland; in the Punjab and other parts of the world.

Rock-salt almost always contains impurities, and therefore is dissolved in water, and the insoluble matters mixed with it are deposited at the bottom. The brine is then drawn off, and evaporated by artificial heat in large iron pans.

Natural brine is obtained at Droitwich and Stoke in Worcestershire, and Nantwich in Cheshire. At Droitwich, the shaft is only sunk 175 feet, and the brine rises to the surface, and overflows if not pumped. There are, however, reservoirs made for it, into which it is pumped, and from which it is distributed to the various works, which are little more than large sheds, with numerous openings in their roofs, to allow the steam free egress. Flues run from end to end of the floors, and on these rest the iron evaporating-pans, which are about 65 feet long by 25 broad, and about 18 inches in depth. In other places, very deep shafts have been sunk, and the brine requires to be pumped from a great depth. The flues heat the brine nearly to boiling-point, and as a large surface is exposed, the evaporation is very rapid, and the crystals are small, as in the fine table salt. If, however, the heat is more gentle, the salt is coarser, and is fit for curing meat, fish, &c.; and when very slow, a much coarser kind, called *bay-salt*, is produced. Salt is obtained from sea-water in many parts of the world, and this is effected by simply evaporating it in brine-pits or shallow square pools, dug on the shore for the purpose. When the evaporation has proceeded to a certain extent, the liquid assumes a reddish colour; a pellicle of salt forms on its surface, which soon breaks, and sinks down, to be followed by another; and the crystallisation then proceeds rapidly. When complete, the salt is removed to sheds open at the sides, and then piled in heaps, in order that the chloride of magnesium may be removed. This is very easy, for as it is extremely deliquescent, it liquefies by exposure to the atmosphere, and runs out. The salt is then redissolved and crystallised, if great fineness is required.

SA'LTA, a town in the north-west of the Argentine Confederation, capital of a state of the same name, and about 150 miles distant from the Araucanian and Bolivian frontiers. It stands on the banks of the upper waters of the Salado, at the height of upwards of 3900 feet above sea-level; but even with this elevation its climate is unhealthy.

It is well built, contains a number of good edifices, and about 11,000 inhabitants.

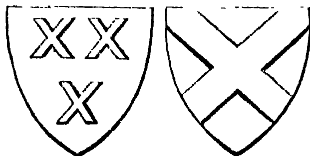
SALT-CAKE is the term employed to designate the crude sulphate of soda made from oil of vitriol and common salt, and used in the preparation of carbonate of soda.

SALTCOATS, a seaport on the Firth of Clyde, county of Ayr, 25 miles by railway south-west of Glasgow. Muslins are woven, chemical works are in operation, salt is manufactured, and coal is exported. Pop. (1861) 4778.

SALTILLO, a city of Mexico, capital of the state of Coahuila, 250 miles west-south-west of Matamoras. It is regularly laid out, contains a public square and fountain, and carries on manufactures of blankets and ponchos. Pop. 8105. Seven miles south is Buena Vista, famous for the battle fought there, February 1847, when the Mexican forces were repulsed by an inferior United States army.

SALTING, the process by which animal and vegetable substances are preserved for food by the aid of common salt. This is either done by rubbing dry salt into the flesh to be preserved, and repeating the process from time to time, until it has absorbed sufficient to arrest decomposition; or the salt is liquefied with a little water, and made into brine, in which articles are placed until required for use, when a little soaking and washing removes the superfluous salt. Vegetables are only salted in the latter way: and continental nations use it extensively for the preservation of various kinds of vegetable food for winter consumption. A little saltpetre is often added, and very much increases the efficiency of the common salt. See ANTISEPTICS, FOOD.

SALTIRE, one of the ordinaries in Heraldry, its name of uncertain etymology, representing a bend sinister conjoined with a bend dexter, or a cross placed transversely like the letter X. Like the other ordinaries, it probably originated, as Mr Planché suggests, in the clamps and braces of the



Saltire.

shield. The form of the saltire has been assigned to the cross on which St Andrew is said to have been crucified; hence the frequency of this ordinary in Scotch heraldry. A saltire is subject to the variations of being engrailed, invected, &c., and may be *couped*. When two or more saltires are borne in a shield, they are couped, not at right angles, but horizontally; and as they are always so treated, it is considered superfluous to blazon them as couped. Charges disposed in the form of a saltire are described as placed *saltireways*, or *in saltire*. The former term is more properly applied to two long charges, as swords or keys, placed across one another (in which case the rule is, that the sword in bend sinister should be uppermost, unless otherwise blazoned); and the latter to five charges placed two, one, and two.

SALT LAKE CITY, the chief town and ecclesiastical capital of the Mormon territory of Utah, U.S., is on the east bank of the river Jordan, between Lake Utah and Great Salt Lake, 20 miles south of the latter, and 4350 feet above the level of the sea, 650 miles east-north-east of San Francisco, and 1100 west of the Mississippi. It was settled by the Mormons (q. v.) in 1847, and contains 260 lots of ten acres each; 4 public squares; shaded streets 128 feet wide, through each of which flows a stream of pure water from the neighbouring mountains, 10,000 feet high, from which the gardens are irrigated. The houses are chiefly built of adobes, or sun-dried bricks, each wife in the polygamic families having a separate entrance. The principal edifices are the Mormon Temple, the Tithing-house or Treasury, and the Social Hall, which serves for ball-room and theatre. Pop. in 1860, 8218.

SALT OF SATURN, an old name for acetate of lead.

SALT OF SORREL, the common name for binoxalate of potash.

SALT OF TARTAR, a commercial name for carbonate of potash in a very crude form.

SALT OF TIN is the term employed by the dyer and calico-printer for protochloride of tin, which is extensively used as a mordant, and for the purpose of deoxidising indigo and the peroxides of iron and manganese.

SALT RANGE, or **KALABAGH MOUNTAINS**, a mountain range in the Punjab, India, lies in an east and west direction, in lat. 32° 30′—33° 20′. The range rises on the west bank of the Jhelum, runs west to the Indus, and after affording a passage to the river, reappears on its west side, and pursues the same direction till it meets with the Suleiman Mountains. The S. R. is about 200 miles in length, and rises to the height of 2500 feet. Its appearance is exceedingly bleak and barren; vegetation is seldom met with; there are no trees; and the bold and bare precipices which frequently occur, give to the range a forbidding aspect. Rock-salt is found in inexhaustible quantities, and so pure, that after being pounded, it is ready for use. Alum, iron ore, coal, gypsum, and limestone abound; gold-dust is washed down in the sands of the rivers, and graphite is also found.

SALT, SPIRITS OF, the old name for muriatic or hydrochloric acid.

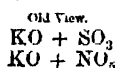
SALTS, SMELLING, a preparation of carbonate of ammonia with some of the sweet-scented volatile oils, used as a restorative by persons suffering from faintness. The pungency of the ammonia is all that is useful, and the oils are added to make it more agreeable. Oils of lavender, lemon, cloves, and bergamot are those chiefly used. The celebrated Preston smelling-salts are scented with oils of cloves and pimento. The manufacture of ornamental bottles to contain this preparation is an important branch of the glass and silversmith's trades.

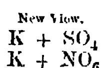
SALTS, THEORY OF. Any substance which is produced by the combination of a base with an acid, is commonly termed a *salt*. The base is in most cases a metallic oxide, which is capable of uniting with an acid, and of more or less completely neutralising the distinctive properties of the latter; in some cases, however, the base is non-metallic and organic in its nature, as in the case of ammonia, morphia, quinia, strychnia, creatinine, &c.

The salts derive their generic name from common salt, now known as chloride of sodium, but till the time of Davy regarded as a compound resulting from the union of hydrochloric (or as it was then termed, *muriatic*) acid and soda. See SODIUM. Davy, however, shewed that during their action upon each other, both the acid and the alkali undergo decomposition, and that while water is formed by the union of the oxygen of the alkali (NaO) and the

hydrogen of the acid (HCl), the sodium of the former combines with the chlorine of the latter to form chloride of sodium (NaCl). Hence, strangely enough, the very substance from which the salts derive their name as a class, was the means of overthrowing the old idea that a salt, as a matter of necessity, must result from the union of a base with an acid. It was then proposed to divide salts into two classes—those formed by the union of a base with an oxyacid, such as nitrate of potash (KO,NO_5), formed by the union of oxide of potassium with nitric acid, sulphate of soda (NaO,SO_3), carbonate of lime (CaO,CO_2), &c., which were termed *oxysalts;* while the other class consisted, like chloride of sodium, of a metal combined with the characteristic element (chlorine, iodine, bromine, fluorine) in a hydrogen acid or hydracid (as, for example, hydrochloric, hydriodic, hydrobromic, or hydrofluoric acid). The salts of this second class, of which chloride of potassium (KCl) and fluoride of calcium (CaF) may be quoted as examples, being constructed on the same plan or type as sea-salt, were termed *Haloid Salts* (q.v.), from the Greek word *hals,* the sea. The chlorine, iodine, bromine, or fluorine, which, in combination with a metal, forms a haloid salt, is by some writers termed a *salt-radical.*

'The great resemblance in properties between the two classes of saline compounds, the haloid and oxysalts, has very naturally led to the supposition, that both might possibly be alike constituted; and that the latter, instead of being considered compounds of an oxide and an acid, might with greater propriety be considered to contain a metal in union with a compound salt-radical, having the chemical relations of chlorine and iodine. On this supposition, sulphate and nitrate of potash will be constituted in the same manner as chloride of potassium, the compound radical replacing the simple one.





Old View.	New View.
$KO + SO_3$	$K + SO_4$
$KO + NO_5$	$K + NO_6$

Hydrated sulphuric acid will be, like hydrochloric acid, a hydride of a salt-radical, $H + SO_4$. When the latter acts upon metallic zinc, the hydrogen is simply displaced, and the metal substituted. No decomposition of water is supposed to occur, and consequently the difficulty of the old hypothesis is at an end. When the acid is poured upon a metallic oxide, the same reaction occurs as in the case of hydrochloric acid; water and a haloid salt are produced. All acids must be, in fact, hydrogen acids; and all salts haloid salts, with either simple or compound radicals.'—Fownes's *Manual of Elementary Chemistry,* 9th ed., 1863, p. 269.

This view, which is frequently termed *the binary theory* of salts, was originally suggested by Davy, but it remained for many years nothing more than (to use the words of Professor Miller) 'an elegant hypothesis,' till it was further illustrated by certain of Liebig's researches in organic chemistry, and till, in certain special cases, it received direct confirmation from the voltaic researches of Daniell and Miller, who found that when a current from two or three of Grove's cells was transmitted through fused nitrate of silver (AgO,NO_5), the latter was resolved into crystals of silver (Ag) at one pole, and NO_6 (which at once broke up into red fumes of peroxide of nitrogen and free oxygen) at the other.

But although the binary theory serves to explain in the most satisfactory way many chemical changes, as, for example, the modifications of phosphoric acid and phosphate of soda (see Miller's *Inorganic Chemistry,* 2d ed., 1860, p. 333; or Galloway's *Second Step in Chemistry,* 1864, pp. 128—130), there are many objections to it, and it will probably give place to other views regarding the constitution of salts. For a notice of these objections, we must refer to the above-mentioned works of Miller and Galloway. Some of our most eminent chemists, as, for example, the editors of Fownes's *Manual,* take a more hopeful view. According to Drs Bence Jones and Hofmann, 'the general application of the binary theory still presents a few difficulties. But it is very probable that the progress of discovery will ultimately lead to its universal adoption, which would greatly simplify many parts of the science.'

The salts may be arranged according to their mode of composition into:

1. *Neutral* or *Normal Salts;* 2. *Acid Salts;* and 3. *Basic Salts.* A salt is *neutral* which is composed of as many atoms or equivalents of the acid as there are of oxygen in the metallic base. If the base is a protoxide, or contains 1 atom of oxygen, 1 atom of the acid is combined with it. Sulphate of potash (KO,SO_3), nitrate of copper (CuO,NO_5), and carbonate of potash (KO,CO_2) are all neutral in their composition, each consisting of one atom of the acid in combination with one atom of a metallic protoxide. But all these salts are not neutral, if we judge of their neutrality by their exerting no action on litmus or turmeric paper, for while the first is neutral to test-paper, the second exhibits an acid, and the third an alkaline reaction; and hence the use of the term *normal,* in preference to that of *neutral,* as applied to this class, has been judiciously advocated by Miller and other chemists. If the base is a sesquioxide, three atoms of the acid combine with one atom of the base to form a neutral or normal salt: thus, the sulphates of alumina and of sesquioxide of iron are represented by the formulæ $Al_2O_3,3SO_3$ and $Fe_2O_3,3SO_3$; and as these salts not only redden litmus, but have an acid taste, they afford an additional reason for our preference to the term *normal* over *neutral* salts.

Acid Salts are generally formed by dissolving normal salts in the same kind of acid which they contain, by which means a new salt is often, but by no means always formed. Thus, if normal sulphate of potash (KO,SO_3) be dissolved in hot sulphuric acid, tablets of a new and strongly acid salt will appear as the solution cools. These crystals consist of bisulphate or acid sulphate of potash, and their composition is represented by the formula $KO,HO,2SO_3$, or KO,SO_3+HO,SO_3, in which the atom of water may be regarded as acting in the character of a weak base. If a similar experiment is made of dissolving nitrate of potash in hot nitric acid, no new salt will be formed, the nitre crystallising out unchanged. Why some acids should have the power of forming acid salts, and others should not possess the property, is unknown.

In *Basic Salts,* or *Sub-salts,* as they are often termed, the proportion of base predominates over that of the acid, there being two or three or more atoms of the basic oxide combined with one atom of the acid. Thus, nitric acid forms with oxide of lead not only the normal salt, PbO,NO_5, but three basic salts—viz., $2PbO,NO_5$, $3PbO,NO_5$, and $6PbO,NO_5$. Sulphuric acid forms with oxide of mercury not only the normal salt, HgO,SO_3, but the basic salt commonly known as *turpeth mineral,* and represented by the formula $3HgO,SO_3$.

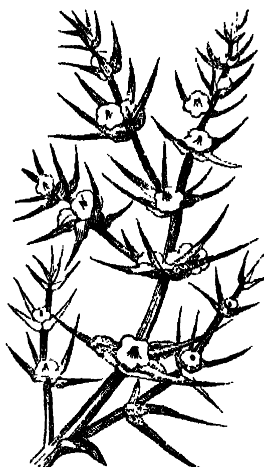
There is one other class of salts requiring a brief notice—viz., the *Double Salts.* Many neutral salts containing the same acid, but different bases,

may be made to combine so as to form salts of the class now under consideration. Thus, sulphate of potash and sulphate of alumina (both of which are neutral sulphates) by combining, give rise to the double salt popularly known as alum, and represented by the formula $KO,SO_3 + Al_2O_3,3SO_3 + 24$ Aq. Similarly, double salts of silicic acid are of common occurrence. Thus, the varieties of felspar are double silicates of alumina with potash, soda, lithia, or lime, but most commonly with potash, and they may be represented by the general formula $MO,SiO_2 + Al_2O_3,3SiO_2$, where MO stands for potash, soda, &c.

The salts at ordinary temperatures are solid bodies, with a strong tendency to crystallisation, although a considerable number are amorphous. They may be either colourless or coloured. When a colourless acid combines with a colourless base, the resulting salt does not exhibit colour. A coloured base combining with a colourless acid transmits its colour to the resulting salts, and if a coloured acid combine with a colourless base, a similar but less marked result ensues. The salts usually have a decided taste, which is usually dependent on the base; the sulphites are, however, an exception to this rule, as their taste resembles that of the acid. They are variously influenced by high temperatures: some remain unchanged; while others volatilise, fuse, and either simply lose their water of crystallisation, or become decomposed. Most salts are soluble in water, and some, as, for example, carbonate of potash and chloride of calcium, have so strong a tendency to dissolve in that fluid, that they abstract the moisture of the atmosphere. Such salts are termed *deliquescent*. As a general rule, hot water exerts a far more powerful solvent action than cold. There are, however, some remarkable exceptions to this law. Thus, the solubility of common salt (chloride of sodium) is very nearly the same, whatever be the temperature of the water, and certain salts of lime are more soluble in cold than in hot water.

It has been already shewn that an atom of water enters into the composition of certain salts in precisely the same way as an atom of potash or any other base. Such water is termed *basic water*, and is an integral constituent of the salt, from which it cannot be expelled by an ordinary heat. This water is quite distinct from the *water of crystallisation*, which is taken up by many salts in a definite quantity, when crystallising from water, and which is readily expelled by a gentle heat without altering the chemical properties of the salt. The crystalline form of salts which contain water of crystallisation is much influenced by the proportion in which the latter occurs. Thus, green vitriol (sulphate of iron) crystallises in two different forms and with two different proportions of water according to the temperature at which the salt separates from its solution. The number of equivalents of water of crystallisation may vary from 1 to 24, which is the highest number yet observed. In order to distinguish the water of crystallisation from water acting as a base, we characterise it by the symbol Aq. (from the Latin *aqua*, water). The ordinary phosphate of soda is represented by the formula $2NaO,HO,PO_5 + 24$ Aq. Many salts which contain water of crystallisation (for example, sulphate or carbonate of soda) give off the whole or a part of their water of crystallisation in a dry atmosphere, and crumble to powder; such salts are said to *effloresce*. Salts which contain no water of crystallisation are termed *anhydrous;* of which nitre (KO,NO_5) is an example. All salts, when dissolved in water, are readily decomposed by the electric current, the base going to the negative, and the acid to the positive pole. In consequence of this result, the acid is termed the electro-negative, and the base the electro-positive constituent of the salts. When a haloid salt is similarly treated, the halogen (chlorine, &c.) is separated at the positive pole, while the metal is liberated at the negative pole.

SALTWORT (*Salsola*), a genus of plants of the natural order *Chenopodiaceæ*, having hermaphrodite flowers, with 5-parted perianth, and a transverse appendage at the base of each of its segments, five stamens and two styles, the seed with a simple integument. The species are numerous, mostly natives of salt-marshes and sea-shores, widely



Prickly Saltwort (*Salsola kali*).

diffused. One only, PRICKLY S. (*S. kali*), is found in Britain. It has herbaceous prostrate much-branched stems, awl-shaped spine-pointed leaves, and axillary solitary greenish flowers. It was formerly collected in considerable quantities on the western shores of Britain, to be burned for the sake of the soda which it thus yields. *S. sativa* is the chief Barilla (q. v.) plant of the south of Spain.

SALU'TE is a compliment paid in the Navy and Army, when a royal or other distinguished personage presents himself, when squadrons or armed bodies meet, when officers are buried, and on many other ceremonial occasions. There are several modes of saluting: firing great guns and small-arms, dipping colours, flags, and topsails, presenting arms, manning the yards, cheering, &c. A royal salute consists in the firing of 21 great guns; in the lowering by officers of their sword-points, and the dipping of the colours. Persons of less elevated rank, entitled to be saluted, receive less extensive honours. A form of salute of more frequent occurrence is when a soldier 'presents arms.' The various forms of military salute, such as the firing of guns, lowering swords, and presenting arms alike render the ship or soldier so doing powerless for aggression. They thus symbolise friendliness, the putting of yourself in the power of the person saluted, submission.

SALU'ZZO, an episcopal city of Northern Italy, in the province of Cuneo, at the foot of the Alps, 22 miles east of Mount Viso. It is a fine old city, and contains a semi-Gothic cathedral built in 1480, with pillars of rare marbles, and colossal statues exquisitely sculptured, a seminary for priests, a royal college, and several elementary and infant schools. The Tower of the Commune, an ancient and singular

building, is worthy of notice; also the Abbey of Staffarda, founded in 1135 by the Marquis Tommaso I., and destroyed in 1341; an ancient civic palace, and the old castle, formerly the residence of the marquises of Saluzzo, now a penitentiary. Its products are grain, hemp, and wine; and its manufactures are silk fabrics, iron goods, and hats. Pop. 16,208.

SALVAGE (from Lat. *salvare*, to save) is the payment due by the owner of a ship or cargo to persons who may have been instrumental in saving it from extraordinary danger—from the sea, fire, or an enemy. The propriety of this allowance as an incentive to the saving of life and property, has always been admitted; and though the correctness of the principle which allows salvage to royal ships for saving vessels of their own nation, may be questioned on the ground that their duty is to protect such ships under all circumstances, yet it is admittedly expedient to offer a fair pecuniary reward as an additional incentive to what may often be an irksome duty.

Salvage was recognised in the earliest maritime codes—as in the laws of Rhodes, Oleron, and Wisby. The law of England divides it into two classes, civil and hostile salvage. *Civil Salvage* is saving a vessel or her cargo, or part thereof, from the perils of the deep; hostile salvage recovers it from an enemy or pirate after capture. No proportion is laid down in civil salvage, as generally applicable. Each case must be decided on its own merits, the ingredients for decision being, 1st, the degree of danger incurred by the salvors; 2d, the degree of peril in which the property rescued stood; 3d, the degree of skill, labour, and time evinced in the salvage; 4th, the value and nature of the property. Except where the assistance rendered has been trifling, the salvage usually ranges from a third to a half of the property saved. A contract to render assistance negatives any claim to salvage on account of such assistance. A passenger can only claim salvage when, having had the opportunity, while the danger existed, of quitting the ship, he voluntarily remains to render help. A royal ship is bound to aid a merchantman in distress; but it can still claim salvage.

When the parties cannot agree as to the amount of salvage, the Admiralty Court has jurisdiction over all cases which occurred at sea, or between high and low water mark. The rules for trying salvage cases are fixed by the statute 16 and 17 Vict. c. 131 (1853).

Hostile Salvage is fixed by 43 Geo. III. c. 160 (1803) at one-eighth the value of the property saved for royal ships, and one-sixth for private vessels. Ships and merchandise taken from pirates pay one-eighth as salvage, 6 Geo. IV. c. 19 (1826).

In the case of saving a vessel belonging to an allied or neutral power, reference is made in awarding salvage to the laws of such power, and to the degree of reciprocity it grants to British vessels.

SA'LVÉ REGI'NA, the first words of one of the most popular prayers in the Roman Catholic Church, addressed to the Blessed Virgin Mary. It forms part of the daily office of the Roman Breviary, and is recited at the end of 'Lauds' and of 'Complin.' But it is still more in use as a prayer of private devotion, and concludes with an earnest and tender appeal for the intercession of the Blessed Virgin with her Son, 'that we may be made worthy of the promises of Christ.'

SA'LVO is a concentrated fire from a greater or less number of pieces of artillery. Against a body of men, a salvo is generally useless, as the moral effect is greater in proportion to the area over which devastation is spread; but with fortifications, the case is otherwise. For the purpose of breaching, the simultaneous concussion of a number of cannon-balls on masonry, or even earth-work, produces a very destructive result. At Almeida, after the French had fired a few salvos of 65 guns, the castle sank in a shapeless mass. The effect of a salvo of modern artillery, with its enormous steel shot, against iron-plated ramparts, has never yet been tried in actual war. The concentrated fire of a ship's broadside forms a powerful salvo.

SA'LZBRUNN, the name of three villages, NEU, NIEDER, and OBER S., in Prussian Silesia, 37 miles south-west of Breslau. The villages are dull, and worthy of notice only from their eight mineral springs, and their much-frequented baths. About 2,500,000 bottles of alkalo-saline water are annually exported. Pop. in all, from 2000 to 3000.

SA'LZBURG, a crown land in the west of Austria, bounded on the west partly by Bavaria, and partly by the Tyrol. Area, 2730 sq. m.; pop. 148,530. The principal mountain-ranges are the Noric Alps, which traverse the south of S. from west to east, and rise in the Grossglockner to the height of 12,360 feet; and branches of the Rhætian Alps, which separate the Tyrol from S., and ramify throughout the middle districts of the latter, rising in the Ewiger Schneeberg to 9580 feet. Snow-fields and glaciers occur in the more elevated regions. The chief river, the Salza, drains the greater part of the crown-land, flows first east, then north, and is 147 miles in length. The climate is cold and variable, but healthy, and although, of the whole area, 2000 sq. m. are capable of bearing crops, this crown-land is inferior to most of the provinces of the monarchy in quantity and value of products. The rearing of cattle and horses is an important branch of industry. Salt is obtained in large quantities, especially at Hallé (q. v.). Salzburg is the capital.

SALZBURG (anc. *Juvavia*), perhaps the most charmingly situated town in Germany, is the capital of the Austrian crown-land of the same name, and stands on both banks, but chiefly on the left bank of the Salza, 190 miles west-south-west of Vienna by railway. Here the river, banked on both sides by precipitous crags, rushes through what seems to be a natural gateway, and flows northward to its junction with the Inn. The picturesque situation of the city is thus described by Wilkie: 'It is Edinburgh Castle and the Old Town brought within the cliffs of the Trosachs, and watered by a river like the Tay.' The heights on either bank of the Salza are crowned with edifices. That on the left, called the Mönchsberg, is surmounted by the castle, called Hohen-Salzburg, an irregular feudal citadel of the 11th c., and, during the middle ages, the residence of the archbishops of S., who combined the dignity of princes of the German empire with their ecclesiastical rank. The castle itself is now dismantled, but still serves as a barrack. A statue of Mozart (q. v.) adorns one of the squares. Opposite Mönchsberg is the Capuzinerberg, with a convent. The cathedral, a large and beautiful Italian edifice, was built in the early part of the 17th century. The architectural taste of the archbishops has adorned the city with many beautiful edifices, chiefly in the Italian style. The city is surrounded by walls, here and there dismantled, and the bastions are for the most part in a state of decay. The city is the seat of an archbishop, and contains numerous libraries, museums, and educational and other institutions, among which is an upper gymnasium, and the *Mozarteum*. It carries on manufactures to some extent, is in communication

with Vienna by railway, and is the seat of considerable transit-trade. Pop. 18,550.

SALZKA'MMERGUT, called also the *Austrian Switzerland*, one of the most picturesque districts of Europe, forms the south-west angle of the crown-land of Austria ob der Enns, between the crown-lands of Salzburg on the west, and Styria on the east. Area, 249 sq. m.; pop. (1864) 17,000, of whom 6500 are Protestants. The scenery combines in rare beauty the usual features of valley, mountain, and lake. The vales are clothed with a rich verdure, and are studded with clumps of fruit and forest trees; the mountains are covered with beeches and oaks; higher up with pines and larches, and in some instances are topped with everlasting snow. The highest peak, Grosse Priel, reaches an altitude of 7931 feet. But the district derives its reputation for beauty chiefly from its lakes, the largest and most famous of which are the Hallstadt and the Traun, or Gmunden lakes. They are bordered with lofty mountains, which rise sheer from the surface of the water; and their pit-like character, and the strong light and shade thrown on them from the mountains, combine to render the scenery, of which they form the centre, unusually sublime. The Hallstadt and Traun lakes are connected, and indeed formed by the river Traun. The district of S. derives its name from the salt which is obtained in enormous quantities from its springs and mines. Salt being a government monopoly in Austria, the works are under the management of the *Kammer*, or exchequer. From 6000 to 7000 of the inhabitants are employed in the salt-works, and the amount annually obtained is 39,375 tons. The chief seats of the salt-works are Ischl (q. v.) and Hallstadt. Little or no agriculture is carried on in the S., and the inhabitants not engaged in the main industry of the district are engaged in cattle-breeding and in the timber trade.

SA'LZWEDEL, a small manufacturing town of Prussian Saxony, 54 miles north-north-west of Magdeburg, on the Jeetze. It carries on sugar-refining, and manufactures of linen, woollen, and cotton fabrics. Pop. 7212.

SAMANI AND DILEMI were two dynasties which divided between them the kingdom of Persia towards the beginning of the 10th century. They both rose to power through the favour of the califs, but they speedily threw off the yoke. The Dilemi, divided into two branches, exercised sovereign authority in Kerman, Irak, Fars, Khuzistan, and Laristan, always acknowledging their nominal dependence on the calif; and during the whole period of their rule, one of the southern branch of this family was vested with the dignity of *emir-ul-omra*, or vizier, and managed the affairs of the califate. Several of the Dilemi were able and wise rulers, as the remains of their works of irrigation and other structures amply testify; but Mahmud of Ghizni put an end to the rule of the northern branch in 1029, and the Seljuks subjugated the southern one in 1056, by the capture of Bagdad, their last stronghold. Their more powerful rivals, the *Samani*, had obtained from the calif the government of Transoxiana in 874 A.D.; and to this, Ismail, the most celebrated prince of the family, speedily added Khaurezm, Balkh, Khorassan, Seistan, and many portions of Northern Turkestan. Rebellions of provincial governors distracted the Samanide monarchy towards the end of the 10th c., and in 999 A.D. their dominions north of Persia were taken possession of by the khan of Kashgar, the Persian provinces being added by Mahmud of Ghizni to his dominions.

SAMAR, one of the Philippine Islands (q. v.).

SAMARA', a frontier government of Russia, bounded on the E. by the Kirghiz Steppes, and on the W. by the governments of Saratov, Simbirsk, and Kazan. Area, 60,592; pop. 1,530,039. It was erected into a government by ukase of December 1850, and was formed out of portions of the governments of Simbirsk, Orenburg, and Saratov. The Volga, which forms the western boundary, and its affluent, the Samara, are the chief rivers. The country is very fertile, and agriculture and fishing are among the chief employments of the inhabitants. Only a comparatively small portion of the country is colonised. Chief town Samara (q. v.).

SAMARA, capital of the Russian government of the same name, on the left bank of the Volga, at the junction of that river with the Samara. It is the chief grain-market on the Volga, and it contains numerous storehouses, especially for grain. A good trade in salt, fish, caviare, and tallow is also carried on. From S. comes a great number of lambs' skins, which are famous for their fineness. Pop. 25,343.

SAMARA'NG, an important seaport on the north of Java, 385 miles (by steamboat course), east of Batavia, in 6° 57′ 20″ S. lat., and 110° 26′ 30″ E. long., is the capital of the Residency, and the point to which the produce of Middle Java is brought for exportation to Europe. Pop. 30,000. The city lies on the right bank of the river Samarang, a shallow, muddy stream 90 feet in breadth. The Chinese, Malays, and Arabians have their own captains, and separate quarters of small, dark, dirty houses. The 1600 Europeans dwell partly along the sea-shore, but chiefly on the left side of the river, by the shady road to Bodjong, the resident's house, which is two miles from the city. The Protestants and Roman Catholics have each a church, orphan-house, and school. There are 3 public and 12 private schools, an excellent hospital for 550 patients, and other charitable institutions.

Only small vessels can enter the river. The roadstead is exposed to the west wind, and is dangerous during the rainy season. Besides the usual trades, the natives work in gold, silver, copper, and tin. Coffee, rice, sugar, tobacco, and indigo are the chief exports, an agent of the Netherlands' Trading Company (q. v.) being established at S. to attend to the government trade.

In 1860, the pop. of the residency of S. amounted to 970,201 souls, 3765 being European, and 10,730 Chinese.

SAMA'RIA (Heb. *Shomerôn*, Chald. *Shamrayin*, Septuagint, *Samareia*, *Semerôn*, &c.), anciently a city of Palestine, the chief seat of the Ephraimitic Baal-worship, and, from the seventh year of Omri's reign, the capital of the kingdom of Israel. It was beautifully situated on a hill about six miles north-west of Shechem, and probably derived its name (which may be interpreted 'pertaining to a watch' or a 'watch-mountain') from the position of the hill, which rises from the centre of a wide valley, and commands an extensive prospect; but an eponymous etymology is adopted by the writer of 1st Kings, who says (chap. xvi. verse 24): 'And he [Omri] bought the hill Samaria of Shemer for two talents of silver, and built on the hill, and called the name of the city which he built, after the name of Shemer, owner of the hill, Samaria.' The date assigned to Omri's purchase is 925 B.C., from which time S. became the seat of government, which had been formerly at Thirsa. It was twice besieged by the Syrians (901 B.C., and 892 B.C.), under Ahab and Joram, on both occasions unsuccessfully; but in 721 (720) B.C., it was stormed by Shalmaneser, king of Assyria, after a three years' siege. Its inhabitants, together with those of all the other

'cities of Samaria' (which had become the general name for the country itself in which the city stood), i. e., the kingdom of Israel—or the 'ten tribes'—were then carried off into a captivity from which they never returned. Their place was supplied, after a time, by colonists, planted there by Shalmaneser and Esarhaddon, from Babylon, Cuthah, Ava, Hamath, and Sepharvaim (according to 2d Kings, chap. xvii. verse 24; Media and Persia, Josephus's *Antiquities*, x. 9, 7), who constituted the original body of the people subsequently known as Samaritans, but whose bulk was gradually increased by accessions of renegade Jews and others. The question has been much, and on the whole unprofitably, discussed, whether these so-called 'Samaritans' were a mixed race of remanent Israelites and heathen Assyrians, or whether they were exclusively the latter. The mere language of Scripture, strictly construed, seems to favour the second of these views, unless the term 'cities' of 2d Kings, xvii. 24, is intended to imply that the ancient inhabitants dwelt in the open country. On the other hand, we find, apart from the other reasons against so unparalleled a wholesale deportation, Israelitish inhabitants under Hezekiah and Josiah, both in Ephraim and Manassoh. Modern authorities therefore assume that they were, to a certain extent, what they always insisted on being, Israelites—(not Jews). i. e., a people largely intermixed with Israelitish elements, that, during the exile, had adopted the worship of Jehovah. The returning Jews, however, would not recognise their claims to the participation in the national *cultus* and temple, and a bitter antagonism sprang up between the two nationalities. In 409 B. C., a rival temple was erected on Mount Gerizim, and a rival priesthood and ritual organised, and henceforth the breach, for some periods at least, became apparently irreparable—'the Jews had no dealings with the Samaritans,' and *vice versâ*. At other periods, however, a more friendly intercourse seems to have taken place between them. The rabbinical laws respecting the 'Kushites' (Cuthim), as they were called by the later Jews, are therefore strangely contradictory, and their discrepancies can only be explained partly by the ever-shifting phases of their mutual relations, and partly by the modifications brought about in the Samaritan creed itself. The later history of the city of S. is somewhat checkered. It was captured by Alexander the Great, when the 'Samaritan' inhabitants were driven out, and their place supplied by Syro-Macedonians. It was again taken (109 B.C.) by John Hyrcanus, who completely destroyed it. Soon rebuilt, it remained for the next 50 years in possession of the Jews; but Pompey, in his victorious march, restored it to the descendants of the expelled Samaritans, who had settled in the neighbourhood, and it was refortified by Gabinius. Herod the Great rebuilt it with considerable splendour, and called it Sebaste, in honour of the Emperor Augustus, from whom he had received it as a present. In the 3d c., it became a Roman colony and an episcopal See. Its prosperity perished with the Mohammedan conquest of Palestine; and at present, it is only a small village called Sebustieh, an Arab corruption of Sebaste, but contains a few relics of its former greatness. 'Samaritans,' as a religious sect, still exist at Nablus (anc. Shechem), as they have existed in the district uninterruptedly through all the vicissitudes of war and conquest from the time of Christ. Their present creed and form of worship agree in many particulars with that of the so-called 'rabbinical' Jews, although the Samaritans pretend utterly to reject the 'Traditions.' They alone, however, have retained the paschal sacrifice of a lamb. The language of the ancient Samaritans is a Hebræo-Aramaic dialect, but contains a number of non-Semitic (Cuthæan) words. It only survives in a few fragments of ancient literature, a translation of the Pentateuch, and some liturgical pieces. The present inhabitants speak Arabic.—See Dr Robinson's *Biblical Researches*, Raumer's *Palästina*, and Dean Stanley's *Sinai and Palestine*, &c.

SAMA'RITAN PENTATEUCH, a recension of the commonly received Hebrew text of the Mosaic law, in use with the Samaritans, and their only canonical book of the Old Testament. Some vague allusions in some of the Church Fathers (Origen, Jerome, Eusebius), and one or two more distinct, but less generally known Talmudical utterances respecting this recension, were all the information available up to the early part of the 17th c. (1616), when Pietro della Valle acquired a complete codex from the Samaritans in Damascus. Since then, the number of manuscripts of the Samaritan Pentateuch, with and without translations (in Arabic), has considerably increased in European libraries; and fragments, consisting of special books or chapters, are of the most frequent occurrence. In fact, writing portions of Samaritan Pentateuch on the oldest of skins, would, in the face of the great demand for the article on the part of ignorant European, especially English, travellers, appear to be a favourite and lucrative pastime, if not an established trade and business, among the modern Samaritans.

These MSS. are written in the Samaritan character, a kind of ancient Hebrew writing, probably in use before, and partly after the Babylonish exile, and vary in size from octavo to folio, the writing being proportionately smaller or larger. Their material is vellum, or cotton paper, and the ink used is black, with the exception of the Nablûs MS., which is written in gold. There are neither vowels, accents, nor diacritical points, the single words are divided from each other by dots. None of the MSS. that have reached Europe are older than the 10th century. The Samaritan Pentateuch was first edited by J. Morinus in the Paris *Polyglott* (pt. iv. 1632) from *one* codex (whence it found its way into Walton), and was last re-edited, written in the square Hebrew characters, by B. Blayney, Oxford, 1790. The first publication of this strange document, and principally the *Exercitationes Ecclesiasticæ*, with which J. Morinus accompanied it, marks a certain epoch in modern biblical investigation; for, incredible as it now appears, it was placed by Morinus and his followers far above the received Hebrew text, which was said to have been corrupted from it. As reasons for this, were adduced its supposed superior 'lucidity and harmony,' and its agreement with the Septuagint in many places. This opinion, which could only have been entertained by men devoid of knowledge, was zealously cherished, and fiercely combated for exactly 200 years, when the first proper and scientific investigation (by Gesenius) set it at rest, once for all, among the learned world at least. This absurd notion chiefly owed its popularity to the anti-Jewish as well as anti-Protestant tendency of its supporters, to whom every attack against the received form of the text—that text upon which alone the Reformers professed to take their stand, was an argument in favour of the Roman Catholic dogma as to the 'Rule of Faith' (q. v.). This boasted superiority *en bloc*, gradually dwindled down to two or three passages, in which the Samaritan reading seemed preferable, and even these have now been disposed of in favour of the authorised Masoretic text. The variants, which Gesenius was the first to arrange systematically, present simply the ordinary aspect of partly conscious, partly unconscious corruptions. They

arose, for the greatest part, from an imperfect knowledge of the first elements of grammar and exegesis. Others owe their existence to a studied design of conforming certain passages to the Samaritan mode of thought, speech, and faith, more especially to shew that Mount Gerizim was the spot chosen by Jehovah for his temple. There are, however, only two essential alterations respecting the Mosaic ordinances themselves to be found, one, Exod. xiii. 7, where the Samaritan Pentateuch has 'six days shalt thou eat unleavened bread,' instead of 'seven;' and Deut. xxiii. 17, where our 'shall be no' is altered into 'shall not live.' A chronological peculiarity deserves special mention—viz., that no one in the antediluvian times begets his first son in the Samaritan Pentateuch after the age of 150, either the father's or the son's age being altered in proportion; after the Deluge, however, the opposite method is followed of adding 50 or 100 years to the father's years before the begetting of a son. We will only further add that anthropomorphisms, as well as anthropopathisms, are most carefully expunged, and that in Deut. xxvii. 4, Gerizim is wilfully substituted for Ebal.

It is, in the absence of a critical edition, exceedingly difficult to do more than speculate on the age and origin of the Samaritan Pentateuch, and opinions remain indeed widely divergent. The principal opinions on the subject are, briefly, either that it came into the hands of the Samaritans as a natural inheritance from the Jewish people, whom they succeeded at the time of the Babylonish exile; or that it was brought to them by Manasse (*Jos. Ant.* xi. 8, s. 2, 4), when the Samaritan sanctuary on Mount Gerizim was founded; or, again, that the Israelitish priest sent by the king of Assyria to instruct the new settlers in the religion of the country, brought it with him. Of other more or less isolated opinions, only that one deserves further notice, that it was a late and faulty recension, into which glosses from the LXX. (Septuagint) were received. This agreement between the LXX. and the Samaritan Pentateuch, to which we have already alluded, has likewise given rise to many speculations and suggestions. The foremost of these are, that the LXX. have translated from the Samaritan Pentateuch; that mutual interpolations have taken place; that both versions were formed from Hebrew codices, differing among themselves, as [illegible] as from the authorised recension; and that many wilful corruptions have been superadded at a later time; finally, that the Samaritan has been altered from the LXX. There is also a translation of the Samaritan Pentateuch (which is Hebrew) into the Samaritan idiom; it is ascribed by the Samaritans to their high-priest, Nathaniel, who died 20 years before Christ. It was probably a kind of popular version, like the Targums (q. v.), and was composed, very likely, shortly before the destruction of the second temple. The translation is done in the most slavish and incompetent manner. Another Arabic version is due to Abu Said, in Egypt (1070), based on Saadiah's translation; and to this Samaritan-Arabic translation, a Syrian, Abu Barachat, wrote, in 1208, a commentary, which is sometimes erroneously taken to be an independent Syriac version of the Samaritan Pentateuch. Among the principal modern writers on the Samaritan Pentateuch are Gesenius, Kirchheim, and Deutsch.

SAMARKA'ND, the most celebrated city of Central Asia, belongs at the present day to the khanat of Bokhara, and is in lat. 40° 2' N., and long. 67° 3' E., 4 English miles south of the Zer-Afshan (a river which 'loses itself in the sands'), and 145 miles nearly east-by-north from Bokhara. It is situated at the foot of Mount Chobanata, in a plain of exuberant fertility; and when seen from a distance, its glittering minarets, lofty domes, and prominent edifices and ruins, relieved by the brilliant green of the closely-planted gardens interspersed within the walls, present even to the European eye an imposing effect; while to the wild Turkoman, familiarised with the dreary expanse and barren aridity of the pathless desert, it seems the very image of paradise. This favourable impression is, however, considerably weakened on a closer acquaintance, the interior of the city presenting too many of the distinctive features of Asiatic cities in general. S. is equal in extent to Teheran, and far excels it in picturesqueness, but much of it is now in ruins, and almost uninhabited; the remainder, which constitutes the 'new city,' is surrounded with walls, pierced with six gates, and has in the *righistan*, or market-place, a number of bazaars, at which a retail trade in leather goods (held in high esteem), enamelled wooden saddles, and other articles of general utility, is carried on. The old or 'ruined city' is, however, the portion more exclusively interesting to Europeans, as the capital of the great Tartar empire, and the seat of that mighty conqueror who wielded the sceptre of Asia from China to the Hellespont, and the terror of whose name caused the rulers of Eastern Europe to tremble on their thrones. Many of the ruins belong to this epoch, among which are the Hazreti Shah Zinde, which Timur used as a summer palace; the Mesjidi Timur ('mosque of Timur'), the walls of which are adorned with fine inscriptions in gold lettering, and which contains a sword and breastplate said to have belonged to the great emir; the citadel, containing his reception-hall in which is seen the celebrated Kohtash, or 'green stone,' on which his throne was placed; and the Turbeti Timur ('sepulchre of Timur'), a small neat chapel crowned with a splendid dome, in the floor of which, directly under the dome, are two tombstones, one over the grave of Timur, and the other over that of his teacher and spiritual guide. The remains of Timur are placed in a vault underneath, access to it being had by means of a long narrow staircase, though this is a favour rarely granted. The tomb is, by the terms of his last testament, constantly guarded by a body of Nozai Tartars. The other ruins, of later date, are chiefly *medresse*, or sacred colleges, some of them richly decorated; and still partially inhabited by students and teachers of Moslem theology. The resident population is now believed not to exceed 15,000 or 20,000, of whom two-thirds are Uzbegs, and one-third are Tajiks; though, from the constant passing and repassing of caravans from Persia, Afghanistan, and western Turkistan to Khokan and Kashgar, the actual population averages considerably more. S. is the residence of the emir of Bokhara during the heat of summer.—See *Travels in Central Asia during* 1863, by Arminius Vambery (Lond. 1864). S. was the ancient *Maracanda*, the capital of Sogdiana. It was seized by the Arabs 707 A.D., and from this time belonged either to the califate or to some of the dynasties which were offshoots from it, till 1219, when it was taken by Genghiz Khan. In 1359 it was captured by Timur, and ten years afterwards became the capital of his empire. On the division of his empire after his death, it continued the capital of Turkistan till 1468, when the attacks of the Uzbeks put an end to its prosperity.

S'ÂMAVEDA is the name of one of the four Vedas. See VEDA.

SAMBA'S. See PONTIANAK.

SAMBOO, or **SAMBUR.** See RUSA.

SAMMATÎYA is one of the four divisions of

the *Vaibhâshika* system of Buddhism; its reputed founder was *Upâli*, a disciple of *the* Buddha, Sâkyamuni.—See C. F. Koeppen, *Die Religion des Buddha* (Berlin, 1857); and W. Wassiljew, *Der Buddhismus, seine Dogmen, Geschichte und Literatur* (St Petersburg, 1860).

SA'MNITES, an ancient Italian people of Sabine origin, who occupied an extensive and mountainous region in the interior of Southern Italy. They were surrounded on the north by the Peligni, Marsi, and Marrucini; on the west and south-west by the Latins, Volscians, Sidicini, and Campanians; on the south by the Lucanians; and on the east by the Apulians and Frentani. The S. were divided into four nations: 1. The *Caraceni* in the north, whose capital was Aufidena. 2. The *Pentri* in the centre, whose capital was Bovianum, and who constituted the most powerful nation of the Samnite stock. 3. The *Caudini*, in the south-west. 4. The Hirpini in the south, whose capital was Beneventum. For an account of their origin, ethnological affinities, and history, see ROME, HISTORY OF.

SAMO'AN ISLANDS. See NAVIGATORS' ISLANDS.

SA'MOS (Mod. Gr. *Samo;* Turk. *Susam Adassi*), an island in the Ægean Sea, is situated about a mile off the coast of Asia Minor, in the Bay of Scalanova, about 45 miles south-south-west of Smyrna. Its length is 30 miles; its mean breadth about 8 miles. A range of mountains, which may be regarded as an insular continuation of Mount Mycale, on the mainland, runs through the whole island, whence its name—Samos, being an old Greek word for any height in the neighbourhood of the sea. The highest peak, Mount Kerkis (anc. *Cercteus*), reaches an elevation of 4725 feet. S. is still, as in ancient times, well wooded. Between its eastern extremity and the mainland lies the narrow channel of Mycale (called by the Turks the *Little Boghaz*), where, in 479 B.C., the Persians were totally defeated by the Greeks under the Spartan Leotychides. Between the island and Nicaria (anc. *Icaria*), on the west is the *Great Boghaz*, from 3 to 8 miles broad, and much frequented by vessels sailing from the Dardanelles to Syria and Egypt. S. is well watered and very fertile, exporting considerable quantities of corn, grapes, wine, oil, valonia, &c.; its mountains furnish quarries of marble. The present capital, called Khora ('the town'), is situated on the south side of the island, at the base of a hill (about 2 miles from the sea), on which ruins of the ancient acropolis (*Astypalaia*) are still visible. On the north coast lies Vathy or Bathy, which derives its name from its deep (Gr. *bathys*) harbour. The pop. variously estimated at from 30,000 to 50,000.

Anciently, S. was one of the most famous isles of the Ægean. At a very remote period, it was a powerful member of the Ionic Confederacy, and (according to Thucydides) its inhabitants were the first, after the Corinthians, who turned their attention to naval affairs. Their energy and resources were soon seen in the numerous colonies which they established in Thrace, Cilicia, Crete, Italy, and Sicily. But the celebrity of the island reached its acme under Polycrates (q. v.) 532 B.C., in whose time it was mistress of the archipelago. Subsequently, it passed under the power of the Persians, became free again after the battle of Mycale, stood by Athens during the Peloponnesian War, and after several vicissitudes, became a portion of the Roman province of Asia, 84 B.C. Its later history is but the melancholy record of continuous decay, nor till the rise of the modern Greeks against the Turks did it ever again acquire distinction. When the war of independence broke out none were more ardent and devoted patriots than the Samians; and deep was their disappointment when, at the close of the sharp and brilliant struggle, European policy assigned them to their former masters. They are not, however, incorporated, so to speak, with the Turkish empire, but are semi-independent, being governed by a Fanariot Greek, who bears the title of Prince of Samos, and pays tribute to the Porte.

SAMOTHRA'CE, or THRACIAN SAMOS (Mod. Gr. *Samothraki*), an island in the north of the Ægean, north-east of Lemnos (*Stalimene*). It is a rugged and mountainous mass, about 8 miles long by 6 miles broad, towering to the height of 5240 feet, and forming the loftiest land in the whole Greek archipelago. The traveller on the plains of Troy can see its white summit shining afar in the north-west over the intervening hills of Imbros—a proof that Homer drew from personal observation when he made Poseidon watch from his Samothracian throne the events of the war. The island has not a single good port, whence Pliny calls it 'the most harbourless of all isles' (*importuosissima omnium*), but there are some good anchorages. Its history is quite unimportant, and all the interest attaching to it is derived from its connection with the mysterious and gloomy worship of the Cabeiri (q. v.).

SAMOYE'DES, the name of a race widely spread over the extreme north of Europe and Asia, and forming one of the four families of the great Altaian stock. Originally, the S. inhabited the whole of the vast Siberian plain from the Altai to the Arctic Sea, but for many hundred years Mongolian peoples have forced themselves in among them. Their chief seat at present is the region lying between the Obi and the Yenisei. They have been very little influenced by Russian civilisation or Christianity, retain in great measure their old manners and customs, and live by fishing, or the rearing of reindeer. The most important researches concerning their ethnographic and linguistic relations have been made by Castren (q. v.).

SA'MPHIRE (*Crithmum*), a genus of plants of the natural order *Umbelliferæ;* having compound umbels, and an oblong fruit, rather flattened at the back, with five winged ridges, and many *vittae* spread all over the seed. COMMON S.



Common Samphire (*Crithmum maritimum*).

(*C. maritimum*) is a perennial, native of Europe, growing chiefly on rocky cliffs near the sea. It is common in the south of England, but is rare in

Scotland. Its radical leaves are triternate; those of the stem have lanceolate and fleshy leaflets. The stem is about 1½ feet high, the flowers yellow. S. makes one of the best of pickles, and is also used in salads. It has a piquant, aromatic taste. It is generally gathered where it grows wild, but is sometimes very successfully cultivated in beds of sand, rich earth, and rubbish, occasionally supplied with a little salt.—*Inula Crithmoides*, a perennial plant, allied to Elecampane (q. v.), and of the natural order *Compositæ*, a native of the sea-coasts of England, is used in the same way as S., and is often called Golden Samphire.—The young shoots of *Salicornia herbacea* (see Glasswort) are also substituted for it as a pickle, and sold under the name of Marsh Samphire.

SA'MSOE, a small island belonging to the kingdom of Denmark, is situated in the northern entrance to the Great Belt, between Zealand and Jutland. Area, 40 sq. m.; pop. 5500. There are no towns, and the inhabitants owe the considerable comforts they enjoy entirely to the unusual fertility of their island.

SAMSON (Heb. *Shimshon*, compare *Shemesh*, sun), the son of Manoah, of the tribe of Dan, for 20 years 'Judge' over the south-western tribes of Israel—perhaps only of Dan. It would appear, however, as if this title had only been bestowed upon him as a kind of reward for his daring and extraordinary exploits against the neighbouring Philistines, who at his birth held a great part of Palestine tributary. There is in the whole account of his deeds no sign of any superior authority vested in him. His history bears altogether more the general character of a popular tale, or saga, than that of a real historical account. His whole life is surrounded by a marvellous halo from his birth to his death. To his mother, long barren (cf. Gen. xviii. 10, 1 Sam. i. 2, &c., Luke i. 7, &c.), there appeared an angel, who promised her a son on the condition that he should become a Nazarite. He is born: his mother abstaining from all strong drink and unclean food before his birth. His hair, left to grow to its full length, in accordance with the Nazarite rules, endows him with a supernatural strength, which apparently increases with each manifestation. His first feat is his tearing a lion, when on his way to ask a Philistine woman in marriage. Returning the same road, to celebrate his wedding, he finds a swarm of bees in the lion's carcass, and forthwith propounds a riddle, which, through his wife's treachery, costs 30 Philistines their lives. We need not here recapitulate the many similar exploits composing his well-known career, which he ended by pulling down the house upon himself and his enemies the Philistines, so that 'the dead which he slew at his death were more than they which he slew in his life.'

It has been matter of most contradictory speculations, how far his existence is to be taken as a reality, or, in other words, what substratum of historical truth there may be in this supposed circle of popular legends, artistically rounded off, in the four chapters of Judges (xiii.–xvi.) which treat of him. To begin with, difficulties are raised respecting the time in which he is said to have lived. While some hold him to be a contemporary of Eli and Samuel, others see in Eli his successor; others again suppose an interregnum between him and Eli. Next comes the question how he, a Nazarite, could eat honey out of the lion's carcass—a fact, by the way, entirely ignored by Josephus. The miraculous deeds he performed have taxed the ingenuity of many commentators, and the text has been twisted and turned in all directions, to explain 'rationally' his slaying those prodigious numbers single-handed; his carrying the gates of Gaza, in one night, a distance of about 50 miles, the probable distance from Hebron to Gaza, and some have indeed assumed that he did not carry them there all at once, but piecemeal. But the principal difficulty seemed to lie in the well that sprung out of the jaw-bone, and the early Jewish interpreters (Targum, Josephus) take the word Lehi to be the name of a place; a notion countenanced, so far, by Gesenius, as he allows that it might have been 'derived etymologically from this myth.'

The close parallel between the deeds of S. and those of Hercules has caused some to identify the two heroes; yet whose might be the priority, is matter of contest between the different schools of biblical criticism. It is not necessary to enlarge upon this point. It is well known how Hercules slays the Nemean lion; another formidable lion at the Mount of Cithæron; how he catches the stag of Diana and the Cretan bull; how he is kept prisoner in Egypt; how he comes to his death by the agency of a woman; not to mention the extraordinary circumstances of his birth, and the like. See Hercules. This once popular notion, however, of seeing nothing more in S. than the Tyrian sun-god Hercules (Baal-Shemesh, 'Lord of the Sun;' Baal-Chamon, 'Lord of the Heat,' &c.), and the attempt to explain the various 'myths' accordingly, is not countenanced by most modern critics. However embellished and overladen with legends, they say, the account in the Book of Judges may be, there is hardly any doubt as to the real existence of a man S., of extraordinary prowess, who turned his whole might and strength against the hereditary enemies of his people, whose land bordered on that of the tribe to which he belonged; who, with all his blemishes, was possessed by a noble, self-sacrificing patriotism, and never for one moment forgot the chief end and aim of his life, viz., to free his people from foreign yoke. Altogether, he is too human ever to have been an allegory or a parable, the moral of which would, indeed, hardly be perceptible, or to have, as some have conjectured, 'been intended through his whole career to be a living mockery of the Philistine Hercules.'

SAMUEL (Heb. *Shemuel*, heard by or asked from God), the last *Shofet* or Judge of Israel, the 'first of prophets,' the founder of the schools of prophets and of the monarchy in Israel. He was the son of Elkanah and Hannah, a woman of no ordinary gifts, and almost a Nazarite herself, who dedicated the long yearned-for child to the Lord even before his birth. Elkanah was of Levitic descent, living, however, not among his own tribe, but in Ephraim. S., brought up in the sanctuary at Shiloh, under the eyes of Eli, there received his first prophetic call, and from that time forth, his prophetic mission was decided. For about twenty years from the death of Eli and his sons, we hear nothing of Samuel. The first public manifestation of his assumption of the office of judge, is his convoking an assembly at Mizpeh, and routing, at the head of the people, the Philistines—his first and probably his only military achievement. His occupations generally were of a more peaceful character. Dwelling in his own native city of Ramah, where he had erected an altar, he annually went 'on circuit' to the three principal sanctuaries west of the Jordan—Bethel, Gilgal, and Mizpeh, there to instruct and judge the people, and break them from their idolatrous habits, to which they were wont to yield, in imitation of the peoples around them. For the better carrying out of this purpose, he organised special schools of teachers and prophets. These seem to have formed special colonies (Naboth, Bethel, Gilgal, Jericho), and to

have moved about in large numbers. These fraternities were destined to take an important place in the commonwealth, and to exercise the greatest possible influence upon the internal as well as the external affairs of the state, while at the same time they were the teachers of the people, expounding and developing the Mosaic law, and keeping the sacred traditions alive within the houses and hearts of Israel.

The peace S. had restored—for during his lifetime those harassing raids from the neighbouring tribes had entirely ceased—and the happy use he made of it by consolidating the religious institutions and the internal power and union of the people, must have impressed the latter with the advantage of being ruled by a firm and capable head and hand. It would have been easy enough for S. to have got himself elected king of Israel, but the establishment of a dynasty appeared to him utterly contrary to the theocratic character of the law. When, however, his two sons, Joel and Abiah, whom he had installed provisional or supplementary judges, 'turned aside after lucre, and perverted judgment,' and the complaints of the people were loud about them, S. was pressed by its representatives, who foresaw a time of terrible anarchy and lawlessness at his approaching demise, and he was obliged to yield to the general wish of installing a king to judge them 'like all the nations.' See JEWS and SAUL. The further events of S.'s life, as connected with Saul, and subsequently with David, are well known, and will be found indicated briefly under those two heads. As to his character, notwithstanding the reproaches that have been heaped upon him, we cannot but see in him one of the wisest, most sagacious, unselfish, patriotic heroes. He was, doubtless, severe and energetic in the extreme, following the path that seemed to him indicated by Jehovah as the only one leading to the common welfare. Gifted with both the spiritual and worldly supreme power over the people, at a time when they had neither political unity, nor laws, nor a *cultus*, he succeeded in rousing the public spirit, in uniting all the tribes under one banner, and in shaking off the Philistine yoke. He routed idolatry, and raised, by the institution of prophetic schools, the Mosaic religion to the highest eminence, while they at the same time formed a healthy counterpoise to priestcraft. That on finding Saul negligent to certain dicta of the law, for the protection of which alone he had been elected, he casts aside all personal love and fear, and for the sake of saving the country, and keeping its constitutions intact, chooses another more worthy head for the commonwealth, is not more than could be expected from this most zealous champion for Jehovah's commands. The people themselves gave him the most honourable testimony for his uprightness and justice, and later ages place him side by side with Moses.

S. seems, after having anointed David, to have retired from public action, and to have lived in comparative seclusion at Ramah—there is, at least, no further mention of him until his death. The time of his life and the period of his judgeship are not given. It may be presumed that he died not long before Saul. If the latter ruled for twenty years, it may well be that they governed together, as Josephus has it (*Ant.* vi. 14, 9), for eighteen years; his age, however, is not easily calculated, and the opinions about it vary between sixty and ninety years. He was buried at Ramah, and his tomb is still shewn at Nebi Samwil, although, according to Jerome, his remains were removed, under the Emperor Arcadius, to Thrace. All Israel mourned him as they had mourned none since Moses. For his apparition at En-Dor, &c., see NECROMANCY.

SAMUEL (SHEMUEL), **BOOKS OF**, originally formed one work, but were by the LXX. and Vulg. (followed by the recent Hebrew editions since Bomberg) and the Authorised Version, divided into two books, the first closing with the death of Saul. The name they bear is derived from Samuel, as the principal figure in them. He not only stood at the head of the commonwealth at the period they treat of in a spiritual and worldly capacity, but also anointed Saul and David, and exercised an important influence upon their rule. Their contents beginning with the high-priesthood of Eli, the narrative concludes with the death of David, and thus three principal periods are noticeable—1. The restoration of the theocracy, of which Samuel assumes the leadership (I. i.—xii.); 2. The history of Saul's kingship till his death (I. xiii.—xxxi.); and 3. David's reign (II.).

The plan of the whole work is not, as has been stated, to represent one king as he ought not to be—viz., Saul, contrasted by a king after the heart of God, David; but simply to draw the development of the theocracy from the end of the period of Judges to the end of David's reign, its humiliation and its glory under Samuel and David, whose history is, to a certain extent, told with biographical minuteness, on account of their being the divinely-chosen vessels for this great work of the restoration. As to the composition and unity of the books, it has been the prevailing opinion of scholars to see in them not a loose compilation from a number of stray sources, but a consecutive narrative drawn upon ancient and authentic documents. The character of the narrative itself, occasionally dwelling at large upon biographical episodes, occasionally assuming the brevity of a mere chronicle, and at times repeating itself at length, is quite in accordance with ancient Semitic historiography. It has been supposed by some that the books of Samuel were composed by the same hand that wrote the books of Kings, but they belong to a much earlier period. The author appears to have lived after the separation of the kingdoms, but long before the Exile, the language being remarkably pure, and quite free from late forms and Chaldaisms. In all probability, the author was a prophet of the time of Solomon. The Talmudical notion of Samuel's authorship has been rejected by the critics, as inconsistent with the contents and circumstances of the book. There are glosses in the book due to later hands. Of sources, we only find the 'Book of Jashar' mentioned in the work. The author, if he did not use real annals of the empire, which were only first commenced under Solomon, had, at all events, a certain number of prophetical narratives of Samuel's, Saul's, and David's lives and doings before him. As regards the occasional verbal agreement between S. and Chronicles, which has often been commented upon, we may either assume that the latter drew upon the former. or that they both—which is more probable from internal evidence—drew upon the same source, and modified their accounts according to their special tendencies. Altogether, the work before us bears the character of a truly authentic record. Of modern commentators, we mention principally Hensler Königsfeldt, Kalkar, and Thenius.

SAMYDA'CEÆ, a natural order of exogenous plants, which are all trees or shrubs and all tropical, mostly American. The order contains about 80 known species, generally characterised by astringency in the bark and leaves. Some are used in medicine, to make poultices for wounds, lotions for

ulcers, &c. The foliage of *Casearia esculenta* is eatable.

SANÄA', the principal district in Yemen or Arabia Felix, corresponding to the ancient Súba, or Sheba, the land of the Sabeans (q. v.). Its extent is very undefined, but it may be taken to include the country round the capital bearing the same name, to a distance of half a day's journey on the west, north, and east, and on the south it is bounded by the Tehâma and the districts of Láhej and Yáffa.

While the dynasty of the Imáms existed, their sway extended over a much greater space, sometimes, indeed, over the whole of Yemen. Gradually it was encroached upon by the Sheikhs, who had been subject or tributary to them, and by the Turks. A bad system of government prepared the way for intestine strife; on the death of each sovereign, the succession was disputed, and the unsuccessful candidate seldom failed to retain some part of the territory, and to alienate many of the subjects of the legitimate prince, until at length the very shadow of regular government has passed away, and this, the garden of Arabia, which had been ruled by long lines of mighty kings, has been abandoned to anarchy and confusion.

The city of Sanäa is situated in a deep valley, about twenty or thirty miles in length, and six or seven in breadth, and 4000 feet above the level of the sea. This valley is bounded on the east by a high range of mountains called Jebel Nikkum, and is studded throughout its length with large villages.

The city and its suburbs are both surrounded by high walls, and, including the gardens, the circumference is about five and a half miles. The houses are of brick, well and strongly built, and most of them furnished with fountains, while the palaces of the Imáms almost approached magnificence. The Jews, of whom even now there are upwards of 20,000, have a quarter to themselves, distant about half an hour's walk from the Mohammedan town: it contains many buildings, once the abode of affluence and ease, but now bearing unmistakable signs of the devastation committed by the savage and fanatical Mohammedans of the city. The city walls are of unburned brick, and mounted with cannon, but they are in a very bad condition. There are four gates, and at both east and west end a castle containing a palace built in the Saracenic style with extensive gardens round them, and constructed with a view to defence, but now utterly neglected. See YEMEN.

SAN ANTO'NIO, called also San Antonio de Bexar, a city of Texas, U.S., is built near the sources of the San Antonio River, 110 miles south-west of Austin. It is one of the oldest Spanish towns on the continent, and in the Texan revolution of 1836 was the scene of the massacre of the Alamo, when a garrison of 150 men, led by Colonel Travis, and including David Crockett, was surrounded by several thousand Mexicans, and after a heroic resistance killed to the last man. It contains an arsenal, four churches, and (in 1860) 8274 inhabitants.

SAN CASCIA'NO, a city of Central Italy, province of Florence, and ten miles south-west of the city of that name. Pop. 11,258. It is well built. The lands belonging to it produce a very strong wine, highly prized in Italy, also grain, oil, fruit, and mulberries.

SANCHUNIA'THON (SANCHONIATHON, SOUNIATHON), the supposed author of a Phœnician history of Phœnicia and Egypt, called *Phoinikika*. He is supposed to have been a native of Berytus; and the accounts which speak of him as born at Sidon or Tyre, probably take these cities in their wider sense for Phœnicia itself. Our principal information about him is derived from Philo of Byblus, a Greek writer of the beginning of the 2d c. A.D., who translated S.'s history into his own tongue; but both the original and the translation are lost, save a few small portions of the latter, preserved by Eusebius, who uses them as arguments in a theological dispute against Porphyry. According to Philo, S. lived during the reign of Semiramis, queen of Assyria, and dedicated his book to Abibalus, king of Berytus. Athenæus, Porphyry, and Suidas, on the other hand, speak of him as of an ancient Phœnician, who lived 'before the Trojan war.' There is also a discrepancy between the various ancient writers respecting the number of books contained in the *Phoinikika*. Orelli (1826), and after him, C. Müller (1849), published the remaining fragments of S., and the hot discussion raised on their genuineness and value is far from being settled yet. Several critics went so far as to deny the fact of the existence of a S. point blank. According to some (Lobeck, &c.), it was Eusebius; according to others (Movers, &c.), Philo, who fathered his own speculations upon an ancient authority. The latter was actuated, Movers thinks, partly by the desire of proving that the whole Hellenistic worship and religion was simply a faint imitation of the Phœnician; partly by the desire of lowering the value of the Old Testament, by shewing the higher authority of the Phœnician writer; and partly, as was the fashion among the unbelieving philosophers of his age, to bring the popular creed into a bad reputation, by proclaiming his own views under the guise of an ancient sage. Yet even those who deny the authenticity of S., agree in allowing the fragments current under his name a certain intrinsic value, they being founded on real ancient myths. This, in fact, is now, with more or less modification on the part of the different investigators, Ewald, Bunsen, Renan, &c., the prevalent opinion. Ewald contends for the real existence of a S., in which he is supported by Renan. Even if there never was a S., it was not Philo who forged him. There seems no doubt that we have but a very dim and confused reproduction of what, after many modifications, misunderstandings, and corruptions, finally passed the hands of Philo and Eusebius, and was by the Church Father, as we said, quoted in a theological disputation. Yet, even assuming the person of a S., his age—and he insists upon a very remote one indeed—must be placed much lower: into the last centuries before Christ, at the earliest. He would then, it seems, have endeavoured to stem the tide of Greek superiority in all things, by collecting, grouping, and remodelling the ancient and important traditions of his own country, and thus proving to both his countrymen and to the Greeks their high importance, in comparison with the Greek productions, on the field of religion and philosophy.

The *Phoinikika* was not only a cosmogony, it would appear, but a history of his and the surrounding nations; and like similar ancient histories, it probably began with the creation of the world, and contained an account of the Jews. All the historical parts, however, are lost, and nothing remains but a fragmentary cosmogony, or rather two or three different systems of cosmogony, or, according to Movers, merely an Egyptian and Phœnician patchwork, for a brief account of which we refer the reader to the article PHŒNICIA. One of the chief difficulties for us consists in the Phœnician words of S., which Philo either translated too freely, or merely transcribed so faultily in Greek characters as to render them an everlasting puzzle.

Eusebius further contains a fragment of a treatise

by S., *Peri Judaiôn*, but it is doubtful whether this is the work of Philo of Byblus or of S.; and if it be that of the latter, whether it is a separate work, or merely a separate chapter out of his larger work. A forgery, said to contain the whole nine books of S., and to have been found by a Portuguese, Colonel Pereira, at the convent of St Maria de Merinhão, and to have been by him intrusted to a German corporal in Portuguese service, named Christoph Meyer, was published by Wagenfeld (Bremen, 1837), and translated into German (Lübeck, 1837), but was very soon consigned to disgrace and oblivion by Movers, K. O. Müller, and Grotefend, the last of whom had at first not only believed in its genuineness, but even written a preface to the *editio princeps*. There never was such a convent or such a colonel; but the fac-simile taken by 'Pereira' in the convent in Portugal was found to have been written on paper shewing the water-marks of an Osnabrück paper-mill.

SANCROFT, DR WILLIAM, an English archbishop, historically notable as the most distinguished dignitary among the *Nonjurors* (q. v.), was born at Fresingfield in Suffolk, January 30, 1616, educated at the grammar-school of Bury St Edmunds, and at Emanuel College, Cambridge. S. was reckoned a first-rate scholar by his contemporaries; and in 1642, S. was elected Fellow of his college, but in the following year he was deprived of his fellowship by the Puritans for refusing the famous 'Engagement,' after which he went abroad. On the restoration of Charles II., in 1660, he was appointed chaplain to Cosin, Bishop of Durham; and after several preferments, was in 1668 made Archdeacon of Canterbury, and in 1677 was raised, against his inclination, to the first dignity in the church—the archbishopric of Canterbury. The manner in which S. discharged his ecclesiastical duties deserves the highest commendation. He attended King Charles II. on his death-bed, and is said to have spoken very freely to the once 'merry monarch' on the nature of his past life. In 1688, along with several of his brother-bishops, he was committed to the Tower by King James II., for sending him a petition in which they explained why they could not conscientiously order his declaration in favour of liberty of conscience to be read in the churches; but in the events which immediately preceded and accompanied the great Revolution, he played a somewhat ambiguous and perplexing part. At first he refused when James asked him to sign a declaration expressing abhorrence of the Prince of Orange's invasion. Later (December 1683), he even went the length of concurring in an address to William, yet he seems from this point to have drawn back, and to have fallen under the dominion of his theory of the Divine Right of Kings. He was not present at the convention of the lords spiritual and temporal to meet the new monarch, and after the settlement, he refused, along with seven other bishops, to take the oath of allegiance to the government, in consequence of which he was suspended by act of parliament, August 1, 1689, but his actual departure from Lambeth did not take place till June 23, 1691. He then retired to his native village, where he died, November 24, 1693. See Macaulay's *History of England*, vols. ii. iii. and iv.

SANCTIFICA'TION, in distinction from justification, in the nomenclature of Protestant theology, is the process by which the Holy Spirit renews man in the divine image, destroying within him the power of evil, and quickening, educating, and strengthening in him the life of goodness and holiness. Whereas justification is considered as a judicial act on the part of God's free grace, liberating the sinner from condemnation, absolving and pardoning him once for all, sanctification is reckoned a work or process, advancing in various stages of weakness or strength, and only completed in the future life of the believer, when removed beyond the influences of sin that now surround him. In Roman Catholic theology, this distinction between the initiative of the divine life in man (justification) and its progressive development (sanctification), is not maintained, at least in the same precise and logical manner that it has been advocated by Protestants. By the latter, the distinction has been held of first-rate importance in their theological systems, and no less so in their practical conception of the Christian life.

SA'NCTUARY, a consecrated place which gives protection to a criminal taking refuge there; or the privilege of taking refuge in such a consecrated place. Among the Jews, there were cities of refuge to which the slayer might flee who killed a man unawares, and something analogous to a right of sanctuary may also be traced in pagan communities. In the ancient Greek states the temples, or at least some of them, afforded protection to criminals, whom it was unlawful to drag from them, although the food which was being supplied might be intercepted. As early as the 7th c., the protection of sanctuary was afforded to persons fleeing to a church or certain boundaries surrounding it. The canon and more ancient ecclesiastical law recognises this protection to criminals as continuing for a limited period, sufficient to admit of a composition for the offence; or, at all events, to give time for the first heat of resentment to pass, before the injured party could seek redress. In several English churches there was a stone seat beside the altar where those fleeing to the peace of the church were held to be guarded by all its sanctity. One of these still remains at Beverley, and another at Hexham. To violate the protection of this seat, or of the shrine of relics, was an offence too grave to be compensated by a pecuniary penalty. Connected, in England, with the privilege of sanctuary was the practice of *abjuration of the realm*. By the ancient common law, if a person guilty of felony took the benefit of sanctuary, he might, within forty days afterwards, go clothed in sackcloth before the coroner, confess his guilt, and take an oath to quit the realm, and not return without the king's licence. On confessing and taking the oath, he became attainted of the felony, but had forty days allowed him to prepare for his departure, and a port assigned him for embarkation, to which he must immediately repair with a cross in his hand, and embark with all convenient speed. If he failed to depart, or afterwards returned without licence, he was condemned to be hanged, unless he happened to be a clerk, in which case he was allowed the *benefit of clergy*.

By the ancient canons of the Scottish councils, excommunication was incurred by the offence of open taking of thieves out of the protection of the church. Some churches, however, by their superior sanctity, were held practically to afford a much surer asylum than others, and it was not uncommon for the Scottish kings, with the view of strengthening the hands of the church, to give a formal sanction to particular ecclesiastical asylums. One of the most celebrated sanctuaries in Scotland was the church of Wedale, now called Stow, where was an image of the Virgin believed to be brought by King Arthur from Jerusalem. David I. granted the 'King's Peace,' in addition to the protection of the church, to all fugitives from peril of life or limb who betook themselves to the church of Lesmahagow. The Scotch law of sanctuary or *gryth* was, however, guarded from affording too easy an immunity.

A very remarkable right of sanctuary existed in Scotland, under the name of the *privilege of Clan Macduff*, which was alleged to have been granted by Malcolm Canmore on recovering the throne of his ancestors. Any person related within the ninth degree to the chief of Clan Macduff, who should have committed homicide without premeditation, was entitled, on fleeing to Macduff's Cross in Fife, to have his punishment remitted for a fine, or at least to be repledged from any other jurisdiction by the Earl of Fife. There is evidence of this privilege having saved Hugh de Arbuthnot and his accomplices from being proceeded against for the murder of John de Melvil of Glenbervie in 1421.

While the institution of sanctuary often enabled criminals to bid defiance to the civil power, it no doubt was not unfrequently a protection to the innocent, who thus escaped oppression or private enmity pursuing them under the name of law. In rude and unsettled times it seems, on the whole, to have operated beneficially by throwing the control of society into the hands of the clergy, who were less tempted than any other class to misuse that power. But as the civil power and authority of the law were strengthened, the right of sanctuary became useless and mischievous; the civil power endeavoured to narrow the privilege as far as possible, while the church sought hard to preserve it. The English Reformation, though it greatly restricted, did not abolish the right of sanctuary. It was not till 1534 that persons accused of treason were debarred the privilege, and the right of sanctuary for crime was finally abolished by 21 Jac. I. c. 28. Various precincts, however, in and about London, known as sanctuaries, continued to afford shelter to debtors, all which were done away with in 1697, by Act 8 and 9 Will. IV. c. 26.

In Scotland there still exists a sanctuary for debtors in the Abbey and Palace of Holyrood, with its precincts, including the hill of Arthur Seat and the Queen's Park. The sanctuary is placed under the control of a bailie appointed by the Duke of Hamilton as heritable keeper of Holyroodhouse. When a debtor retires to the sanctuary, he has a 24 hours' protection against personal diligence; but in order to extend the privilege longer, he must be enrolled in the books of the abbey. The sanctuary affords no protection to a criminal, a fraudulent debtor, or a crown debtor; nor is it available for protection from personal execution for debts contracted within its precincts, for which the debtor may be imprisoned in the abbey jail.

SAND, GEORGES. See DUDEVANT, MADAME.

SANDALS, a covering for the feet, consisting of soles so attached as to leave the upper part of the feet bare. See SHOES.

SA'NDAL-WOOD (a name corrupted from *Santal* wood), the wood of several species of the genus *Santalum*, of the natural order *Santalaceæ* (q. v.), natives of the East Indies and tropical islands of the Pacific Ocean. S.-W. is compact and fine grained, very suitable for making work-boxes and small ornamental articles, and is remarkable for its fragrance, which, however, is fatal to insects, so that cabinets of S.-W. are extremely suitable for the preservation of specimens in natural history; but it is much too expensive for general use. The odour is due to an essential oil, heavier than water. WHITE S.-W., the most common kind, is the produce of a small tree (*Santalum album*), a native of mountains in the south of India and the Indian Archipelago, much branched, resembling myrtle in its foliage and privet in its flowers. The trunk is seldom more than a foot in diameter. YELLOW S.-W. is probably produced by another species, perhaps *S. Freycinetianum* of the Indian Archipelago and Sandwich Islands, and from these regions the Chinese import it, chiefly for the purpose of burning it both in their temples and in their houses. They reduce it to sawdust, and mix it with paste before burning. Dr Seemann has, however, recently found another and previously-unknown species of *Santalum* (*S. Yasi*) to yield the much-valued S.-W. of the Fiji Islands, where the tree has been almost extirpated in consequence of the demand for its wood in commerce.

RED S.-W., or SANDERS, is the produce of a very different tree, *Pterocarpus santalinus*, of the natural order *Leguminosæ*, suborder *Papilionaceæ*, a native of the tropical parts of Asia, particularly of the mountains of the south of India and of Ceylon. The tree is about sixty feet high, with pinnated leaves, having generally three leaflets, and axillary racemes of flowers. The heart-wood is dark red, with black veins, and so heavy as to sink in water. It is used as a dye-stuff, and also by apothecaries to colour certain preparations. The Arabs use it as an astringent, and it is the basis of some of our tooth-powders. A deep red dye is also yielded by the chips of *Adenanthera pavonina*, a tree allied to the *Acacias* (q. v.), a native of the East Indies. The wood of this tree is sometimes called RED SANDAL-WOOD.

SANDALWOOD ISLAND, called by the natives Tjindana, Sumba and Tanah Tjumba, lies in the Indian Ocean, between 9° 18′–10° 20′ S. lat. and 118° 58′—120° 43′ E. long., has an area of 4966 sq. m., and a pop. of 1,000,000. The coast is steep and rocky, so that, except at the west, south, and east corners, ships can approach quite near. The produce consists chiefly in dye-woods, ebony, timber, cotton, rice, pepper, cocoa, maize, coffee, sugar, wild cinnamon, cocoa nuts, and various fruits. Little sandal-wood is exported, though abounding in the forests, the natives refusing to cut the trees, which they believe to be the dwellings of their ancestors' souls. Exports are: horses, timber, cotton, pepper, wax, tortoise-shell, tow made from bark, maize, and edible nests. The cliffs swarm with the *Collocalia esculenta*, and collecting the nests is a leading occupation of the men. The Sandalwood islanders belong to the Malay race, are well made, wiry, and of a brownish complexion. The most trifling causes lead them to commit suicide, a vice of rare occurrence in other parts of the archipelago.

The S. I. is nominally subject to the Netherlands, but the rajahs and regents are almost independent of foreign influence. The principal havens are at Nangamessi on the north, and Tidd about the middle of the south coast, good anchorage being found in many other parts. Notwithstanding the repressive measures taken by the Netherlands' government, and the destruction, in 1860, of ten vessels engaged in the slave-trade, it is still extensively carried on by the Sandal-wood islanders.

SA'NDARACH, or **SANDARACH RESIN**, is a friable, dry, almost transparent, tasteless, yellowish-white resin, which is imported from the north of Africa. It is completely soluble in oil of turpentine, but not completely soluble in alcohol. When heated, or sprinkled on burning coals, it emits an agreeable balsamic smell. It exudes from the bark of the S. tree (*Callitris quadrivalvis*), a native of the north of Africa, of the natural order *Coniferæ*. The quantity of S. used is not great; it is employed mostly for the same purposes as Mastic (q. v.). The finely-powdered resin is rubbed, as *Pounce*, on the erasures of writing-paper, after which they may be written upon again without the ink spreading.—

The wood of the S. tree is highly balsamic and odoriferous, extremely durable and valuable.

SA'NDAY or **SANDA ISLAND**, one of the most northern of the Orkney (q. v.) group, contained, in 1861, 378 inhabited houses and 2145 inhabitants.

SA'NDBACH, a small market-town of Cheshire, 25 miles east-south-east of Chester by railway, on an eminence on the right bank of the Wheelock. Pop. (1861) 4987, mostly employed in silk-throwing, and in making salt and shoes.

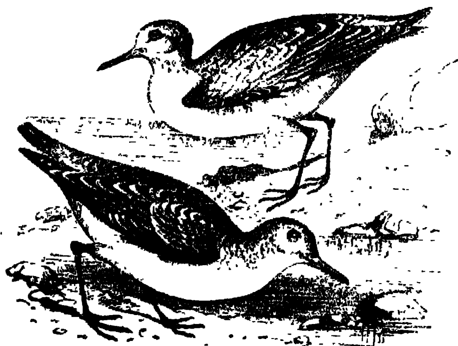
SANDBAGS, in Military works, are canvas bags about 28 or 30 inches in length by from 14 to 16 broad. They are filled with sand or earth, and form a ready means of extemporising a parapet or traverse against the enemy's fire; they are likewise used for protecting the head of a trench, or tamping the charge in a mine. See MINES, MILITARY. Layers of sandbags, two or three deep, and as many high, are often laid on the crest of the parapet in the manner of bricks, with loopholes for small-arms men to use. If employed as lining for embrasures or barbettes, sandbags should be covered with raw hides to prevent them from taking fire.

SA'NDCRACK is a splitting or fracture of the horny fibres of the horse's hoof, extending usually from above downwards; when reaching to the quick it causes lameness, and in all cases it constitutes unsoundness. Horses, with thin, weak, brittle feet, spoilt by much rasping, and rattled on the hard roads, furnish the majority of cases. The horn must be thinned for an eighth of an inch on either side of the crack; across the upper and lower ends of the crack, to prevent its extension, the firing-iron should be drawn, making a line nearly through the horny crust. The opening may further be held together by winding round the foot several yards of waxed string, or fine iron wire. Except in very bad cases, slow work on soft land may be permitted, but road work is injurious. The growth of healthy horn is promoted by applying round the coronet, at intervals of ten days, some mild blistering liniment.

SAND EEL. See LAUNCE.

SANDEMA'NIANS. See GLASSITES.

SA'NDERLING (*Calidris*), a genus of birds of the plover family (*Charadriadæ*), or which perhaps ought rather to be referred to the snipe family (*Scolopacidæ*). The Common S. (*C. arenaria*) is a very widely diffused bird, breeding in the Arctic regions, and migrating southwards on the approach of winter as far as the coasts of Africa, of India, and



Sanderling, Male and Female (*Calidris arenaria*).

of Brazil. It is pretty common on the British coasts, in small flocks, in winter. It is only about eight inches long; its winter plumage very light ash-gray, under parts white. In spring the plumage acquires a reddish tinge with black markings. The S. feeds on marine worms, small crustaceans, &c. It is esteemed for the table, and appears in the London market.

SAND GROUSE. See GANGA.

SAND-HOPPER (*Talitrus locusta*), a small crustacean, of the section *Edriophthalma* (q. v.) and order *Amphipoda*, which so abounds on the sandy sea-shores of Britain, that the whole surface of the sand often seems to be alive with the multitudes which, leaping up for a few inches into the air, fill it like a swarm of dancing flies. This activity is not, however, displayed at all times; but if a mass of sea-weed left by the retiring tide be turned over, countless sand-hoppers may be seen to leap away, or they may be found by digging in the sand, in which they burrow. The S. leaps by bending the body together, and throwing it open with a sudden jerk. It feeds on almost any vegetable or animal substance, particularly on what is already dead and beginning to decay. It is itself the food of crabs, and of many kinds of birds.

SANDHURST, ROYAL MILITARY COLLEGE. In 1802 it was determined to institute a college for the training of military officers, in which professional education should be grafted on the groundwork of general instruction. The college was opened at Great Marlow; but, in 1812, it was transferred to a handsome stone building at Sandhurst. Up to 1862, this was devoted to the education of boys from the age of 13 upwards; a description of the college as then existing is given under CADETS' COLLEGE. By a new regulation, however, the system has been changed; the course limited to one year immediately before entering the army, and the subjects of instruction confined to the higher mathematics, modern languages, and military science. Entrance is on the nomination of the commander-in-chief; and the payment by the cadets' parent or guardian varies from £100 to *nil*, according to the circumstances and rank of the parent. Those for whom no payment is made must be orphans, and are styled 'Queen's Cadets.' All first commissions in the cavalry and infantry of the line, which are granted without purchase, and not to men from the ranks, are given to cadets from the Royal Military College, who compete for these prizes, and obtain them in order of merit.

While at the college the organisation of the young men is purely military, the whole forming a battalion, divided into cadet companies, each commanded by a captain and lieutenant of the regular army. The boys are allowed to hold the non-commissioned ranks in their several companies. In addition to mental labour, gymnastics, riding, boating, and swimming are taught to the students. The situation, on the sandy heaths which mark the union of Hampshire and Surrey, is particularly healthy, while its proximity to London (about 30 miles) and the camp at Aldershot, render it very suitable to its purpose.

The Staff College (q. v.) is a separate institution, about two miles distant.

The estimated charge for the Royal Military College for 1865—1866 is £35,840, of which about £18,000 is covered by the payments for the cadets.

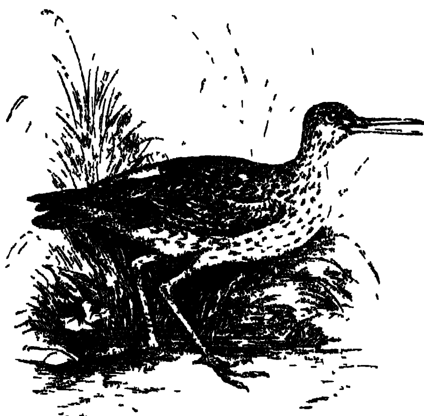
SA'NDIVER, a product of the glass furnaces. When the materials used in the manufacture of glass are melted, a scum arises which has to be removed, this is called sandiver, and is, when powdered, used as a polishing material, and formerly had a considerable reputation as a tooth-powder.

SAND-MARTIN. See SWALLOW.

SAN DOMI'NGO. See DOMINGO, SAN; DOMINICAN REPUBLIC.

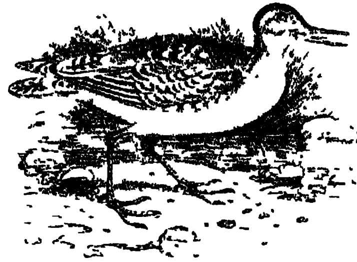
SAND-PAPER is made in the same way as emery-paper (see EMERY), but with sand in place of emery.

SA'NDPIPER, the common English name of a numerous group of birds, generally referred to the family *Scolopacidæ*, all formerly included in the genus *Tringa*, but some now constituting the genera *Totanus, Pelidna, Actitis*, &c., of ornithologists. In characters and habits they are all very similar. They are not of large size; they are very active and graceful in all their movements; their plumage not gay, but of pleasing and finely-diversified colours; their legs are rather long, the lower part of the tibia naked, the tail very short, the wings moderately long; the bill rather long and slender, grooved throughout the whole or a considerable part of its length, straight in some, and a little arched in others. The feet have three long toes before, and one short toe behind; the toes in the genus *Tringa*, as now restricted, are partially webbed at the base, in *Totanus* they are completely separate. They are good swimmers, but are not, however, often seen swimming; they frequent sandy sea-shores, some of them congregating in numerous flocks in autumn and winter; and seek their food by probing the sand with their bills, and by catching small crustaceans in pools or within the margin of the sea itself. Many are birds of passage, visiting high northern latitudes in summer, and spending the winter on the coasts of more southern regions. The flesh of all the species is good, and some of them are in much request for the table.—The British species are numerous. The DUNLIN or PURRE (*Tringa variabilis*) is noticed in the article DUNLIN.—The KNOT (*Tringa canutus*), also known, in different states of plumage, as the RED S. and the ASH-COLOURED S., is a bird of about ten inches in length, appearing in great flocks on the British coasts in winter, and equally common in North America.—The LITTLE S. or LITTLE STINT (*Tringa minuta*), occasionally seen in Britain, occurs in India and in South Africa. The name STINT is given to a number of species of *Tringa*.—The PURPLE S. (*Tringa maritima*), not unfrequent on the British coasts, is reckoned among the birds of Iceland, Greenland, Melville Island, Nova Zembla,



Redshank (*Totanus calidris*).

and Spitzbergen.—Of the genus *Totanus*, to all the species of which the popular name GAMBET is sometimes given, one of the best known species is the REDSHANK (*Totanus calidris*), a bird which resides in Britain all the year, but known also as a summer bird of passage in the most northern parts of Europe and Asia, and occurring in winter as far south as Smyrna, and even in India. It is about eleven inches long. It receives its popular name from its red legs.—The GREEN S. (*Totanus ochropus*) is also a pretty common British species, for the most part migrating to the north for the summer.—The COMMON S. or SUMMER SNIPE (*Totanus hypoleucos*) is in Britain a summer bird



Common Sandpiper (*Totanus hypoleucos*).

of passage.—The GREENSHANK (*Totanus glottis*) is chiefly seen in Britain in spring and autumn, and has its name from the olive-green colour of its legs.—Sandpipers of various species—some of them the same as the British, and others different—are numerous in North America, and in winter in the West Indies.

SANDPIPES are cylindrical hollows existing in chalk deposits. They descend perpendicularly into the chalk at right angles to the surface, tapering downwards, and ending in a point; they reach occasionally a depth of 60 feet, and have a diameter varying from 1 to 12 feet. They are most probably produced by the chemical action of water, charged with carbonic acid, which exists more or less in all rain water, and is especially abundant in water that has been in contact with decaying organic matter. The pipes are filled with sand, clay, or gravel from the overlying deposit.

SANDROCOTTUS, or **SANDROKYPTOS,** is the Greek spelling of the name of the Hindu king Chandragupta, of Pâtaliputra or Palibothra, to whom Megasthenes was sent as ambassador from Seleucus Nicator, and who lived about the beginning of the 4th c. B.C.

SANDSTONE is a rock formed of compacted, and more or less indurated sand. The grains generally consist of quartz, though other mineral substances are often mixed with this; they are colourless, or of a dull white, yellow, brown, red, or green colour. The grains vary in size, forming, as the case may be, a fine or coarse grained stone. The loose sand becomes solidified by pressure simply, but more generally from being cemented together by calcareous, silicious, or ferruginous infiltrations, and the dark colour of the mass is produced by the cement. Sandstones that have undergone great or continuous metamorphic action, pass into Quartzite; and between this and friable sand, all intermediate stages are found.

SANDU'SKY, a city and port of Ohio, U.S., on the south shore of Sandusky Bay, an arm of Lake Erie, 110 miles north of Columbus. The bay, 20 miles long and 5 wide, forms an excellent harbour. The city is built upon a bed of limestone, of which its edifices are constructed, among which are a custom-house, 15 churches, 3 banks, large public

halls, hotels, schools, &c. There are 3 newspapers, manufactures of lumber and bent woodwork for carriages, &c., with extensive fisheries. Pop., in 1860, 8408.

SA'NDWICH (i.e., village on the sands), a Cinque Port, market-town, and municipal borough of Kent, on the right bank of the Stour, 98 miles east-south-east of London by the South-Eastern Railway. Within the last 800 years the sea has here considerably receded, for S., which is now two miles from the shore, is described, at the commencement of the 11th c., as the most famous of all the English harbours—*omnium Anglorum portuum famosissimus*. The town is rectangular, and was surrounded by walls, along which a broad path now leads. The streets are confined; and the houses, which seem crushed together, and the architecture of which recals the times of the Plantagenets, are peculiarly and strikingly antique in appearance. The church of St Clement's, with a low Norman tower, is probably the most interesting edifice. Small vessels importing timber, iron, and coal, and exporting corn, flour, malt, seeds, and hops, come up to the town. Tanning, shipbuilding, and seed crushing are carried on. In conjunction with Deal and Walmer, the town sends two members to parliament. Pop. (1861) of municipal borough, 2944; of the parliamentary borough of S. and Deal, 13,750.

S., the most ancient of the Cinque Ports, probably occupies the site of the Roman *Rutupiæ*, and many interesting antiquities have been found in the vicinity. In the reign of Edward IV. its customs yielded £17,000 yearly, and 95 ships and 1500 sailors belonged to it.

SANDWICH, a favourite viand which is said to have been named after the Earl of Sandwich. It consists of two thin slices of bread, plain or buttered, with some savoury food placed between. Formerly, it was applied exclusively to bread with thin slices of ham, tongue, or beef, but of late a great variety of materials have been used; one celebrated Glasgow confectioner, Mr Lang, has the credit of making one hundred different kinds of sandwiches.

SANDWICH ISLANDS, forming the kingdom of Hawaii, are a rich, beautiful, and interesting chain, eight in number, exclusive of one or two small islets. The chain runs from south-east to north-west, and lies in the middle of the Pacific Ocean, in lat. 19°–22° N., long. 155°–160° W. Area, 6000 sq. m.; pop. (1860) 67,084. The names, with the areas of the respective islands—proceeding from the south-east of the group—are: Hawaii (formerly Owhyhee) 4000 sq. m.; Maui, 620; Oahu, 530; Kaui, 500; Molokai, 167; Lanai, 100; Nihau, about 70; and Kahoolaui, about 60 sq. miles.

Surface, &c.—Situated near the middle of the Pacific Ocean, about half the distance from San Francisco in North America that they are from Melbourne in Australia, and Canton in China, the S. I. form an oasis in the middle of a wide ocean waste, and offer convenient stations for the refreshment and repair of the merchantmen and whalers that traverse the Pacific. They are of volcanic origin, and contain the largest volcanoes, both active and quiescent, in the world. The most prominent physical features of the group are the two lofty mountain peaks of Hawaii, Mauna Kea and Mauna Loa, each of which is 14,000 feet in height, or within 1800 feet of the loftiest of the Alps. Besides these two chief peaks, which stand apart from each other, and one of which is covered with perpetual snow, the island is traversed by other mountains, which give it a rugged and picturesque outline, and in some cases front the sea in bold, perpendicular precipices, from 1000 to 3000 feet in height. In general, the islands are lofty—the small islet of Lehua is 1000 feet high, and the upland regions of Kaui are, on an average, 4000 feet above sea-level. Within the coral reefs, which, in single, and more rarely in double ridges, skirt portions of the coasts, sandy shores, leading up to rich pasture lands, and occasionally to productive valleys, are frequently seen. Everywhere, however, the configuration of the surface betrays the volcanic origin of the islands. Extinct and partially active volcanoes occur in most of the islands. Kilauea, on the Mauna Loa mountain in Hawaii, the largest active volcano in the world, has an oval-shaped crater 9 miles in circumference, and is 6000 feet above sea level. In the centre of this immense caldron is a red sea of lava, always in a state of fusion. At intervals, the lava is thrown to a great height, and rolls in rivers down the mountain sides. From 1856 to 1859, this volcano was in an incessant state of eruption, forming at night a sublime spectacle, and occasionally casting forth burning streams, by one of which a small fishing-village was destroyed, a bay on the shore filled up, and a promontory formed in its place. On Maui, the crater of Mauna Haleakala (House of the Sun), by far the largest known, is from 25 to 30 miles in circumference, from 2000 to 3000 feet deep, and stands 10,000 feet above sea-level. Within this huge pit, about 16 basins of old volcanoes, whose ridges formed concentric circles, have been counted. Good harbours are few. The chief is that of Honolulu (q. v.), in Oahu, with 22½ feet of water in its shallowest parts. On the same island is Ewa, an immense basin, with 12 feet water at low-tides. During the prevalence of the trade-wind, which blows south west for about nine months of the year, the south shores of the islands afford safe anchorage almost everywhere.

Climate, Soil, Rivers, &c.—Though situated within the tropics, the S. I. boast a climate that is temperate rather than tropical. In the native language, there is no word to express the idea of *weather*, and this fact may be considered as evidence that extremes of heat or cold do not occur. At Honolulu, the extremes of temperature in the shade during 12 years were 90° and 53°, and the diurnal range is 12°. Rains brought by the north-east trade wind are frequent on the mountains; but on the leeward side of the islands, little rain falls, and the sun is rarely obscured by clouds. The soil, the constituent parts of which are mainly scoriæ, decomposed lava and sand, is generally thin and poor. This, however, is not universally the case. At the bases of the mountains and in the valleys, where abrasion, disintegration, and the accumulation of vegetable mould, have gone on for ages, there are extensive tracts as fertile as they are beautiful. The islands produce fine pasturage in abundance, and large herds are bred and fattened, to supply meat to the whalers and merchant-ships. On the Waimea Plains, in Hawaii alone, 30,000 sheep of the merino breed were grazing in 1864. The upland slopes of the mountains are clothed with dense forests; and lower down, are grassy plains and sugar and coffee-plantations. Basalt, compact lava, coral-rock, and sandstone, are used for building purposes. No metals occur. Several of the islands, especially Hawaii and Kaui, are well supplied with rivers, which, from the size and conformation of the group, are necessarily small, but afford great facilities for irrigation. Vast numbers of semi-wild horses roam the islands, and while they consume the pasturage, and break down the fences, are of little use. The indigenous fauna is small, and consists mainly of swine, dogs, rats, a bat that flies by day, birds of beautiful plumage, but for the most part songless. Among

the indigenous trees and plants are the sugar-cane, banana, plantain, cocoa-nut, candle-nut, various palms, the taro, a succulent root which formed the staple of the food of the natives, and is still generally used; the cloth-plant; and the *ti*, the roots of which were baked and eaten, while the leaves were used for thatching huts. Cattle and other useful foreign animals and plants were introduced by Vancouver and other navigators. In 1860, there were 30,000 mules and semi-wild horses in the kingdom.

Commerce, Products, &c.—The commerce of this young kingdom is still in its infancy, but is gradually on the increase. Until recently, the most important branch of it was maintained by vessels engaged in the whale-fisheries of the North Pacific. This branch of commerce has greatly declined within recent years. In 1863, 102 whaling-vessels, shewing an increase of 29 upon the number for the previous year, entered the ports. Trusting no longer to the whaling business, the producers and merchants of the S. I. have found out other outlets for their goods, and, without doubt, the trade of the islands will in the future be almost wholly confined to the coasts that bound the Pacific. The islands are within 16 days (by sailing-vessels) of San Francisco, 27 days from Vancouver's Island, 26 days from Kanagawa in Japan, and 67 days from Hong-kong. Sugar, coffee, and rice have been proved to produce well, and all these find ready markets at hand in California, British Columbia, and Vancouver's Island, which, together, can consume more than the S. I. can supply. Of sugar, the 3,000,000 lbs. produced in 1862 were increased to upwards of 5,000,000 in 1863, and from the number of new plantations recently organised, the amount of produce may be expected to continue increasing. The exports, consisting mostly of sugar, coffee, rice, pulu (q. v.), hides, and corn, amounted in 1862 to 838,424 dollars; the imports, mostly manufactured goods, amounted in the same year to 998,239 dollars.

History, Constitution, and Finances.—Of the origin and character of the inhabitants of this kingdom, of its interesting internal history, or of the much-canvassed question as to whether the native race will flourish along with or wither before the Saxon race, it is not within our limits to speak. We can only notice a few of the leading events which have occurred in these islands since our shores were first visited by what the natives called the 'floating islands' of the civilised nations. Although one member of the group was seen by Gaetano in 1542, the islands cannot be said to have been discovered till Cook visited them in 1778. The great navigator treated the simple and confiding natives with a cruelty and a hypocrisy which consort ill with his fame, and which were the direct causes of the brawl in which he met the death he had provoked in Kealakeakua Bay, Hawaii, 1779. In early times, each island had a king; but under Kamehameha I., a man of shrewd sense, and of great bravery and resource, the islands were formed into one kingdom. This king, writing to George III., August 6, 1810, desired formally to acknowledge the king of England as his sovereign, and to place the islands under British protection—an offer which was accepted. After inaugurating the era of advancement, this king died in 1819, and was succeeded by Liholiho, who adopted, on his accession, the name of Kamehameha II., and in whose reign idolatry was abolished simultaneously throughout all the islands. The first Christians who visited the S. I. were Cook and his followers, of whom the simple natives retained no favourable impression. Vancouver, who arrived with Cook in 1778 and returned in 1792, and again in 1794, made sincere attempts to enlighten the natives, and the king and his chiefs requested Vancouver to send out religious teachers to them from England; but the first missionaries that visited the islands came from America in 1820. On their arrival, the missionaries witnessed the singular phenomenon of a nation without a religion. The instructions of Vancouver had not been forgotten, and no doubt enabled the idol-worshipping islanders to see more readily the absurdities of their system. But the spontaneous movement of 1819—1820, when the whole nation rose up to destroy idols, temples, and the furniture of idolatry, 'was no triumph of Christianity—for Christianity had not yet claimed or even approached the Hawaiian Islands.' The nation had voluntarily cast off the religion of their ancestors, and had not yet adopted—were not even acquainted with—any other system. The American missionaries who arrived in 1820 were well received, and the work of instruction was at once begun. Besides instructing them in Christianity, in less than 40 years they taught the whole Hawaiian people to read and write, to cipher and to sew.

Kamehameha II. and his queen visited England, and after a short residence in this country, both died in London, July 1824. Prior to the year 1838, the government was a despotism: but in 1840, the king, Kamehameha III., granted a constitution, consisting of king, assembly of nobles, and representative council. This constitution, based on that of Great Britain, has in more recent times been much matured and improved. In 1843, the independence of the Hawaiian kingdom was formally declared by the French and English governments. Kamehameha IV. acceded to the throne in 1854, and after a brief but useful reign, died in November 1863, and was succeeded by his brother, Kamehameha V. A bishop, ordained in London, is now the spiritual overseer of the islands; and wherever there are inhabitants, there are schools and chapels. The revenue for the year 1859—1860 was 328,107 dollars, the expenditure 321,514 dollars.

SANDWORT. See ARENARIA.

SAN FELIPÉ DE ACONCA'GUA, a town of Chili, capital of the dep. of Aconcagua, 60 miles east-north-east of Valparaiso. It is regularly built, and has a handsome appearance. In the vicinity are copper-mines. Pop. stated at from 12,000 to 13,000.

SAN FELIPE DE JATIVA. See JATIVA.

SAN FRANCI'SCO, the principal seaport on the western coasts of North America, and the chief city of California, U. S., stands on the west shore of San Francisco Bay, 6 miles south of the Golden Gate, the outlet leading west, and connecting the bay with the Pacific Ocean. Lat. 37° 46′ N., long. 122° 23′ W. It has a fine deep harbour, well-built streets, handsome shops, gas and water works, and elegant public buildings, among which are the custom-house, mint, marine hospital, city hospital, 3 theatres, 2 orphan asylums, 1 convent, &c. There are 12,000 houses, of which 8000 are of wood, 25 churches, 12 daily and 12 weekly newspapers, 4 monthly magazines, and numerous schools and charitable institutions. Of the population, attracted by the discovery of gold to S. F., are 12,000 Irish, 5000 Germans, 4000 from Great Britain, 3000 French, 2000 Chinese, &c. There are newspapers in German, French, and Spanish. The Chinese have a church, Roman Catholic, with a Chinese priest educated at Rome, and a school. Among the manufacturing establishments are 9 flour mills, 4 saw mills, 2 woollen factories, and 8 iron foundries. In 1863, 3870 vessels of 1,342,290 tons entered and cleared the port, exclusive of the sailing vessels and

steamers that trade from S. F. to Sacramento, the capital of the state. In the same year, the receipts of gold-dust amounted to £9,777,195; but this sum does not nearly represent all the receipts, as much treasure comes by private hands, and passes through no channel by means of which the amounts can be noted by the authorities. £5,693,450, or more than one-half of the treasure exported, were sent in 1863 to England. The other exports, chiefly wheat, wool, quicksilver, hides, flour, and copper ore, amounted to £2,408,560. Sugar from the Sandwich Islands, rice, coal from Great Britain and Sydney, and manufactured goods are imported. In 1860, 500,000 tons of shipping entered the port. There is a large timber trade with Oregon and British Columbia, and six ocean steamers make regular trips to Panama. In 1776, the mission of St Francis was commenced here by two Spanish monks. In 1825, the mission had under its care 1800 Indians, and possessed 76,000 cattle and 79,000 sheep. In 1834, the property of the mission was secularised, and it rapidly decayed. In 1846, it was taken by the United States, and in 1847 had a population of 450. The discovery of gold in 1848 caused it to be at first nearly deserted; but it soon commenced a rapid growth, which, in spite of several destructive fires, has continued until it had a population in 1860 of 56,805. According to the S. F. *Almanac*, the population of the city has risen in 1863—1864 to 103,000.

SANGAREE', a West Indian beverage, consisting of Madeira wine, syrup, water, and nutmeg.

SA'NGERHAUSEN, a town of Prussian Saxony, in the government of Meresburg, and 33 miles west-north-west of the city of that name. It contains two castles; carries on weaving, tanning, shoemaking, and copper-smelting, and manufactures saltpetre. Pop. 7283.

SANGI'R ISLANDS lie to the north of Celebes, in 2°—4° N. lat., are upwards of 50 in number, of various sizes, and nearly all inhabited. Pop. 30,000. The three largest islands, Great S., Sjiauw, and Tagolandang, with those which surround each, form as it were separate groups. In the S. I. are many mountains, which, except the volcanoes, are clothed to their summits with a rich vegetation. Great S. has an area of 273 sq. m., and is divided into four kingdoms. The usual anchorage is on the west side, in 3° 28′ N. lat., and 125° 44′ E. long. Pop. 13,000. In the north-west is a volcano, called Abu, or the 'Ash Mountain,' which has frequently caused great devastation. In March 1856, the streams of lava and boiling water carried away the rich plantations, and 2806 lives were lost.

Sjiauw lies in 2° 43′ N. lat., and 125° 28′ E. long., is also mountainous; a volcano, on the north-east coast, being 6200 feet high. Pop. 3000. The chief town is Uluw.

Tagolandang, in 2° 20′ N. lat., and 125° 30′ E. long., is populous, and the centre of the missionary work which has been carried on successfully in the S. Islands. A small ship belongs to the station, in which to visit the scattered converts and schools.

In all the islands, the areng (*Saguerus* or *Borassus gomutus*), the sago, cocoa-nut, and the finest sorts of timber-trees abound. Maize, rice, katjang (a species of bean), tobacco, cocoa, and the sugar-cane are cultivated.

The Sangirese belong to the Malay race, are well made and brave, but cunning, lazy, and dirty in their habits. This, and scarcity of pure drinking-water, make them liable to a loathsome skin disease. There are four rajahs in Great S., one in Tagolandang, and one in Sjiauw. The government is monarchical, somewhat limited by a council.

Towards the end of the 15th c., the Sangirese became Mohammedan; a century later, under the Portuguese, they were brought over to Christianity. These islands, forming now a Netherlands dependency, have several Dutch missionaries, and 24 churches, which are also used as schools. Government supports 8 teachers, the villages 16.

SANG-KOI. See TONQUIN.

SANGRAAL. See GRAAL.

SANGUINA'RIA, a genus of plants of the natural order *Papaveraceæ*, having 8—12 petals, 2 stigmas, an oblong swollen capsule with two deciduous valves, and a persistent, many-seeded frame. *S. Canadensis*, the BLOOD-ROOT or PUCCOON of North America, has a fleshy root-stalk abounding in a red juice, which abounds also in the leaf-stalks; and solitary radical leaves, which are roundish, deeply heart-shaped, and with about seven toothed angles. The flowers are solitary and spring from the root, on short stalks. The whole plant is acrid and narcotic, emetic and purgative in large doses; and in small doses stimulant, diaphoretic, and expectorant. It is much used as a medicine in the United States. —It is supposed to owe its properties to a peculiar alkaloid called *Sanguinarine*, which is obtained from it as a white pearly substance. The large white flowers appear early in spring, and are a frequent ornament of flower-borders.

SANGUINE, or **MURREY**, one of the tinctures of less frequent occurrence in Heraldry, denoting blood colour, and represented in engraving by lines crossing each other saltireways.

SANGUISORBA'CEÆ, or **SANGUISO'RBEÆ**, according to some botanists a natural order of plants, but more generally regarded as a sub-order of ROSACEÆ (q. v.). As a sub-order, its distinctive characters are apetalous flowers—the tube of the calyx thickened, indurated, and lined with a disc, generally few stamens, and a solitary carpel, which ripens into a nut enclosed in the calycine tube. About 150 species are known, all of which are herbaceous or half shrubby, some of them spiny.—The leaves of *Acaena sanguisorba*, a native of Van Diemen's Land, are said to be an excellent substitute for tea. Of British species, Burnet (q. v.) and Lady's Mantle (q. v.) are among the best known.

SA'NHEDRIM (Gr. *Synedrion*), the supreme national tribunal of the Jews, established at the time of the Maccabees, probably under John Hyrcan. It consisted of 71 members, and was presided over by the Nasi (Prince), at whose side stood the Ab-Beth-Din (Father of the Tribunal). Its members belonged to the different classes of society: there were priests (*Archiereis*); elders, that is, heads of families, men of age and experience (*Presbyteroi*); scribes, or doctors of the law (*Grammateis*); and others, exalted by eminent learning—the sole condition for admission into this assembly. The presidentship was conferred on the high-priest in preference, if he happened to possess the requisite qualities of eminence; otherwise, 'he who excels all others in wisdom,' was appointed, irrespective of his station. The limits of its jurisdiction are not known with certainty; but there is no doubt that the supreme decision over life and death, the ordeal of a suspected wife, and the like criminal matters, were exclusively in its hands. Besides this, however, the regulation of the sacred times and seasons, and many matters connected with the *cultus* in general, except the sacerdotal part, which was regulated by a special court of priests, were vested in it. It fixed the beginnings of the new

moons; intercalated the years, when necessary; watched over the purity of the priestly families, by carefully examining the pedigrees of those priests born out of Palestine, so that none born from a suspicious or ill-famed mother should be admitted to the sacred service; and the like. By degrees, the whole internal administration of the commonwealth was vested in this body, and it became necessary to establish minor courts, similarly composed, all over the country, and Jerusalem itself. Thus, we hear of two inferior tribunals at Jerusalem, each consisting of 23 men, and others consisting of three men only. These courts of 23 men (lesser Synedrion), however, as well as those of the three men, about both of which Josephus is silent, probably represent only smaller or larger committees chosen from the general body. Excluded from the office of judge were those born in adultery; men born of non-Israelitish parents; gamblers; usurers; those who sold fruit grown in the Sabbatical year; and, in single cases, near relatives. All these were also not admitted as witnesses. Two scribes were always present, one registering the condemnatory, the other the exculpatory votes. The mode of procedure was exceedingly complicated; and such was the caution of the court, especially in matters of life and death, that capital punishment was pronounced in the rarest instances only. The Nasi had the supreme direction of the court, and convoked it when necessary. He sat at the head, and to his right hand was the seat of the Ab-Beth-Din; the rest of the 71 took their places according to their dignity, in front of them, in form of a semicircle, so that they could be seen by both the chief officers. The lictors, or 'sheriffs,' were always present at the session. The court met on extraordinary occasions in the house of the high-priest; its general place of assembly, however, was a certain hall (*Lishcat Hagaziz*), probably situated at the south-east corner of one of the courts of the temple. With exception of Sabbath and feast days, it met daily. The political troubles forced the Sanhedrim (70 B.C.) to change its abode, which was first transferred to certain bazaars (*Hannyoth*) at the foot of the temple mount. After the destruction of the temple and Jerusalem, it finally established itself, after many further emigrations, in Babylon.

We cannot here enter into that most difficult question as to the origin and development of the Sanhedrim, and how far it was intended primarily to be a faithful reproduction of the Mosaic assembly of the 70 (Moses himself making 71), supposed to have been re-established by Ezra after the Exile; any more than we can examine in this place into the widely different opinions respecting the jurisdiction and competence of the Sanhedrim at the time of Christ and the apostles; how far, in fact, it may be said to have existed at all—save for a few matters of smallest importance—curtailed and circumscribed as it was by the Romans, who seem to have recognised only the 'high-priest;' and that collateral but most vital question, whether it was the Sanhedrim at all from whom emanated those well-known acts recorded in the New Testament. There can be no question as to its utter incompetence to arraign Christ for a 'crimen læsæ majestatis,' i. e., for high treason against the Roman emperor. No less difficult is the explanation of many of the proceedings against the apostles ascribed to this body. The suggestion, that the word Synedrion, as used in the New Testament, stands only for an arbitrarily convoked 'lynch-tribunal,' deserves more consideration than it has hitherto received.

SANHITÂ is the name of that portion of the Vedas which contains the Mantras or hymns. See VEDA.

SA'NITARY SCIENCE. See SUPPLEMENT.

SA'NJAK, a Turkish word signifying 'a standard,' is employed to denote a subdivision of an *eyalet* (q. v.), because the ruler of such a subdivision, called *sanjak-beg*, is entitled to carry in war a standard of one horse-tail. The sanjak is frequently called a *liva*, and its ruler a *mirmiram*.

SANJAK-SHERIF. See FLAG OF THE PROPHET.

SAN JOAQUI'N, a river of California, U.S., rises in the Sierra Nevada, and runs first south-west to its junction with the outlet of Lake Tulare, thence north-west to its junction with the Sacramento River, 50 miles from the Bay of San Francisco. It receives numerous branches from both the coast range of mountains and the Sierra Nevada. Entire length 350 miles, for only a small portion of which it is navigable for large vessels.

SAN JOSE', or **SAN JOSE DEL INTERIOR,** the capital of Costa Rica, Central America, on the River Carthago, and 15 miles west-north-west of the remains of the town of that name, which was formerly the capital of the country. It stands on a table-land 4500 feet above sea-level, contains a number of important metropolitan edifices, and carries on an active and important trade. Its port is Punta Arenas, on the Gulf of Nicoyas, 60 miles west. In 1861, 189 vessels of 110,824 tons, and the cargoes of which valued about £386,000, entered and cleared Punta Arenas. Pop. of San José, 16,000.

SAN JUA'N DE PO'RTO RI'CO. See PUERTO RICO.

S'ANKARA, or **S'ANKARÂCHÂRYA,** i. e., the *âchârya*, or spiritual teacher, S'ankara, is the name of one of the most renowned theologians of India. His date, as is the case with most celebrities of that country, is unknown. Tradition places him about 200 B.C., but H. H. Wilson assigns him, with more probability, to the 8th or 9th c. after Christ. With regard to his place of birth and to his caste, most accounts agree in making him a native of Kerala or Malabar, and a member of the caste of the Nambûri Brahmans. In Malabar, he is said to have divided the four original castes into seventy-two, or eighteen subdivisions each. All accounts represent him as having led an erratic life, and engaged in successful controversies with other sects. In the course of his career, he founded the sects of the *Das'nâmi-Dan'd'ins* (see S'AIVAS). Towards the close of his life, he repaired to Cashmere; and finally to Kedârnâth, in the Himalaya, where he died at the early age of 32. His principal works, which are of considerable merit, and exercised a great influence on the religious history of India, are his commentary on the *Vedânta* (q. v.) Sûtras, and his commentaries on the *Bhagavadgîtâ* and the principal *Upanishads* (q. v.). His learning and personal eminence were so great, that he was looked upon as an incarnation of the god S'iva, and was fabled to have worked several astounding miracles. One of these was his animating the dead body of a King Amaru, in order to become temporarily the husband of the latter's widow, so as to be able to argue with the wife of a Brahman Mandana upon the topic of sensual enjoyments—the only topic on which he had remained ignorant, as he had always led the life of a Brahmachârin, or bachelor student. A number of works are current in the south of India relating to his life; among these, the *S'ankara-dig-vijaya*, or the conquest of the world by S., composed by *Anandagiri*, one of his disciples, is the most important.—See H. H. Wilson, *A Sketch of the Religious Sects of the Hindus;* works, vol. i. (edited by Dr R.

Rost, 1862), pp. 197, ff.; and Cavelly Venkata Ramaswami, *Biographical Sketches of Deccan Poets* (Bombay, 1847).

SÂNKHYA (from the Sanscrit *sankhyâ*, synthetic reasoning) is the name of one of the three great systems of orthodox Hindu philosophy. See SANSCRIT LITERATURE. It consists of two divisions—the Sânkhya, properly so called, and the YOGA (q. v.); and like the other systems (see MIMÂNSÂ and NYÂYA), it professes to teach the means by which eternal beatitude, or the complete and perpetual exemption from every sort of ill, may be attained. This means is the discriminative acquaintance with *tattwa*, or the true principles of all existence, and such principles are, according to the Sânkhya system, the following twenty-five: (1), *Prakr'iti* or *Pradhâna*, substance or nature; it is the universal and material cause; eternal, undiscrete, inferable from its effects; productive, but unproduced. Its first production is (2) *Mahat* (lit. the great), or *Buddhi* (lit. intellect), or the intellectual principle, which appertains to individual beings. From it devolves (3) *Ahankâra* (lit. the assertion of 'I'), the function of which consists in referring the objects of the world to one's-self. It produces (4—8) five *tanmâtrâ*, or subtle elements, which themselves are productive of the five gross elements (see 20—24). Ahankâra further produces (9—13) five instruments of sensation—viz., the eye, the ear, the nose, the tongue, and the skin; (14—18), five instruments of action—viz., the organ of speech, the hands, the feet, the excretory termination of the intestines, and the organ of generation; lastly (19), *manas*, or the organ of volition and imagination. The five subtle elements (see 4—8) produce (20—24) the five gross elements—viz., *âkâs'a*, space or ether, which has the property of audibleness, is the vehicle of sound, and is derived from the *sonorous* tanmâtrâ; air, which has the properties of audibleness and tangibility, is sensible to hearing and touch, and is derived from the *aërial* tanmâtrâ; fire, which has the properties of audibleness, tangibility, and colour, is sensible to hearing, touch, and sight, and is derived from the *igneous* tanmâtrâ; water, which has the properties of audibleness, tangibility, colour, and savour, is sensible to hearing, touch, sight, and taste, and is derived from the *aqueous* tanmâtrâ; lastly, earth, which unites the properties of audibleness, tangibility, colour, savour, and odour, is sensible to hearing, touch, sight, taste, and smell, and is derived from the *terrene* tanmâtrâ. The 25th principle is *Purusha*, or soul. It is neither produced nor productive; it is multitudinous, individual, sensitive, eternal, unalterable, and immaterial. The union of soul and nature takes place for the contemplation of nature, and for abstraction from it, 'as the halt and the blind join for conveyance and for guidance, the one bearing and directed, the other borne and directing.' From their union, creation is effected. The soul's wish is fruition or liberation. In order to become fit for fruition, the soul is in the first place invested with a *linga-s'arira*, or *sûkshma-s'arira*, a subtle body, which is composed of *buddhi* (2), *ahankâra* (3), the five *tanmâtrâs* (4—8), and the eleven instruments of sensation, action, and volition (9—19). This subtle body is affected by sentiments, but being too subtle to be capable of enjoyment, it becomes invested with a grosser body, which is composed of the five gross elements (20—24), or, according to some, of four, excluding *âkâs'a*, or, according to others, of one alone—viz., earth. The grosser body, propagated by generation, perishes; the subtle frame, however, transmigrates through successive bodies, 'as a mimic shifts his disguises to represent various characters.' Some assume, besides, that between these two there is intermediately a corporeal frame, composed of the five elements, but tenuous or refined, the so-called *anusht'hâna s'arira*.

Creation, resulting from the union of Prakr'iti (1) and Purusha (25), is *material*, or consisting of souls invested with gross bodies, and *intellectual*, or consisting of the affections of intellect, its sentiments or faculties. *Material creation* comprises eight orders of superior beings—gods, demigods, and demons; five of inferior beings—quadrupeds, birds, reptiles, fishes, and insects; besides vegetable and inorganic substances, and man, who forms a class apart. This material creation is again distributed into three classes: that of *sattwa*, or goodness, comprising the higher gods, with virtue prevailing in it, but transient; that of *tamas*, or darkness, where foulness or passion predominates; it comprises demons and inferior beings; and between these, that of *rajas*, or impurity (lit. coloured condition), the human world, where passion together with misery prevails. Throughout these worlds, soul experiences pain, arising from death and transmigration, until it is finally liberated from its union with person. *Intellectual creation* comprises those affections which obstruct, disable, content, or perfect, the understanding; these amount to fifty. *Obstructions* of intellect are error, conceit, passion, hatred, fear, severally subdivided into 62 species. *Disability* of intellect arises from defect or injury of organs, such as deafness, blindness, &c., and from the contraries of the two next classes; making a total of 28 species. *Content* is either internal or external—the one fourfold, the other fivefold. Internal content concerns nature, proximate cause, time, and luck; external content relates to abstinence from enjoyment upon temporal motives—viz., aversion to the trouble of acquisition, or to that of preservation, and reluctance to incur loss consequent on use, or evil attending on fruition, or offence of hurting objects by the enjoyment of them. The *Perfecting* of intellect comprises eight species; it is direct, as preventing the three kinds of pain; or indirect, such as reasoning, oral instruction, amicable intercourse, &c.

Besides the 25 principles, the Sânkhya also teaches that nature has three essential *gun'as*, or qualities—viz., *sattwa*, the quality of goodness or purity; *rajas* (lit. colouredness), the quality of passion; and *tamas*, the quality of sin or darkness; and it classifies accordingly material and intellectual creation. Thus, four properties of intellect partake of goodness or purity—viz., virtue, knowledge, dispassionateness, and power; and four, the reverse of the former, partake of sin or darkness—viz., sin, error, incontinency, and powerlessness. It is worthy of notice that by power the Sânkhya understands eight faculties—viz., that of shrinking into a minute form, to which everything is pervious; of enlarging to a gigantic body; of assuming extreme levity; of possessing unlimited reach of organs; of irresistible will; dominion over all beings, animate or inanimate; the faculty of changing the course of nature; and the ability to accomplish everything desired. The knowledge of the principles, and hence the true doctrine, is, according to the Sânkhya, obtained by three kinds of evidence—viz., perception, inference, and right affirmation, which some understand to mean the revelation of the Veda and authoritative tradition.

It will be seen from the foregoing summary that the Sânkhya proper does not teach the existence of a supreme Being, by whom Nature and Soul were created, and by whom the world is ruled. It was therefore accused by its opponents to be atheistical, or to deny the existence of a creator; and it is the special object of the *Yoga* system

to remove this reproach, by asserting his existence, and defining his essence (see YOGA). The truth however, is, that the Sânkhya proper merely maintains that there is no proof for the existence of a supreme Being; and the passages quoted by the opponents, to shew that the founder of the Sânkhya *denied I's'wara*, or a supreme God, are quite compatible with the view, that he confined his teaching to those *tattwas* or principles which, in his opinion, were capable of demonstration. Nor is it at all probable that the founder of the orthodox Yoga would have propounded his system as supplementary to that of the Sânkhya proper, had there been that incompatible antagonism between them which must separate an atheistical from a theistical philosophy. The Sânkhya system underwent a mythological development in the Purân'as (q. v.), in the most important of which it is followed as the basis of their cosmogony. Thus, *Prakr'iti*, or nature, is identified by them with *Mâyâ*, or the energy of Brahmâ; and the Matsya-Purân'a affirms that *Buddhi*, or *Mahat*, the intellectual principle, through the three qualities, goodness, passion, and sin, 'being one form, becomes the three gods, Brahmâ, Vishn'u, and S'iva.' The most important development, however, of the Sânkhya is that by the Buddhistic doctrine, which is mainly based on it. The Sânkhya system is probably the oldest of the Hindu systems of philosophy; for its chief principles are, with more or less detail, already contained in the chief Upanishads (see VEDA); but whether the form in which it has come down to us, and in which it is now spoken of as *the* Sânkhya, is also older than that in which the other systems are preserved, is a question as yet not solved by Sanscrit philology. That this form, however, is not the oldest one, is borne out, for instance, by the differences which exist between the Sânkhya doctrine of the Upanishads and the doctrine propounded in the first book of the Institutes of Manu on the one side, and the doctrine of the actual Sânkhya on the other.

The reputed founder of the actual Sânkhya is *Kapila* (lit. *tawny*), who is asserted to have been a son of Brahmâ, or, as others prefer, an incarnation of Vishn'u. He taught his system in Sûtras (q. v.), which, distributed in six lectures, bear the name of *Sânkhya-Pravachana*. The oldest commentary on this work is that by *Aniruddha*; another, is that by *Vijnânabhikshu*. The best summary of the Sânkhya doctrine is given by I's'wara Kr'ishn'a, in his *Sânkhya-Kârikâ*, edited by H. H. Wilson, with a translation of the text by H. T. Colebrooke, and a translation of the commentary of Gaud'apâda by himself (Oxford, 1837). For the various theories concerning the word Sânkhya, and the founder of the system, Kapila, and for the literature relating to it, see the elaborate and excellent preface by Fitzedward Hall to his edition of the *Sânkhya-Pravachana*, with the commentary of Vijnânabhikshu, in the *Bibliotheca Indica* (Calcutta, 1856); and see also his valuable *Contribution towards an Index to the Bibliography of the Indian Philosophical Systems* (Calcutta, 1859). Amongst essays on the Sânkhya philosophy, the most reliable still remains that by H. T. Colebrooke, reprinted from the *Transactions* of the Royal Asiatic Society, in his *Miscellaneous Essays* (London, 1837), vol. i. p. 227, ff.

SAN LU'CAR DE BARRAME'DA, a seaport of Andalusia, in the modern province of Cadiz, and 18 miles north of the port of that name, stands on a sandy, undulating tract on the left bank of the Guadalquivir, and at the mouth of that river. It is a dull decaying place, and is notable chiefly as the mart whence inferior and adulterated vintages are exported to England as sherries. Pop. 16,000.

SAN LU'IS POTO'SI, a considerable town of Mexico, capital of the state of the same name, stands near the source of the river Tampico, and 200 miles west of the port of that name on the Mexican Gulf. It stands on a plateau 6350 feet above sea-level, is well built, containing many handsome edifices, chiefly ecclesiastical, and is surrounded by gardens. Its markets are well supplied, and it carries on a considerable trade with the neighbouring states. Shoes, hats, and hardware are the chief manufactures, and woven fabrics and liquors are imported from Tampico. Pop. 40,000.

SAN MARI'NO. See MARINO, SAN.

SAN MIGUE'L, a town of Central America, in San Salvador, and about 80 miles east of the city of that name. It is said to be the chief trading town in Central America. At its annual fair of La Paz, 15,000 strangers assemble, and business to the amount of 2,000,000 dollars is transacted. About five miles west of S. M. is a volcano, 6680 feet high, which was in a state of eruption in 1848, and again in 1855.

SAN MINIA'TO, a city of Central Italy, province of Florence, and 21 miles west-south-west of the city of that name. S. M. is a fine old episcopal city, adorned with many monuments, and is famous in the history of the Florentine Republic. Pop. 15,599.

SANNAZARO, JACOPO, a distinguished Italian poet, of Spanish descent, was born at Naples, July 28, 1458. Love for a young lady called Carmosina Bonifacia, whom he has celebrated under the names of Harmosine and Filli, was what developed his poetical faculty. The lady being insensible to his passion, he sought to forget her in travel. It was during his absence that he composed the *Arcadia*, a medley of prose and verse, of which Tiraboschi, the historian of Italian literature, thus speaks: 'The elegance of the style, the propriety and the choiceness of the expressions, the descriptions, the imagery —everything, in fact, is fresh and original.' The work was greatly admired, and in the course of a century went through sixty editions. It has given its author the reputation of being an Italian classic. S., after his return to Italy, was invited to the Neapolitan court, and composed some comedies for the amusement of the royal family, of which only one has been preserved. He died at Naples in 1530 or 1532. His other productions are *Sonetti e Canzoni*, *Eclogæ VI.* (reckoned by some his most perfect performance); *Elegiarum Libri III.*; *De Morte Christi ad Mortales Lamentatio*; and *De Partu Virginis, Libri III.*, mostly written in Latin verse. S.'s life has been written by Crispo and J. A. Volpi. See also Tiraboschi's *Storia della Letterat. Ital. VII. Part* iii.

SAN NICA'NDRO GARGANICO, a town of Southern Italy, in the province of Capitanata, 26 miles north of Foggia. Pop. 8186. It is situated on Mount Gargano, and is one of the most populous towns among those mountains. The lands belonging to it are very fertile, and great herds of cattle and sheep are reared there. It trades in grain, wool, and wine.

SAN NI'COLAS, or SAN NICOLÂO, one of the Cape Verd Islands (q. v.), and residence of the bishop of the group.

SAN RE'MO, a city of Northern Italy, province of Porto Maurizio, 27 miles east-north-east of Nice. It is built on the slope of a rising ground on the shores of the Mediterranean. Its fine cathedral, the Santuario della Guardia, and the Santuario dell' Assunta are worthy of notice, the last having four handsome pillars of alabaster. The palace of the Marquis Borrea D'Olmo contains a fine picture-gallery.

There is a seminary for priests, besides a college and many schools. Its little harbour carries on a brisk trade in oils and lemons. Nine foreign consuls reside in the town. S. R. is an ancient city, and obscure in its origin. In 1170, it was self-governed, and made an alliance with the Genoese against the Pisans. One of its bishops afterwards sold it to Genoa. 'San Remo is perhaps the mildest situation on all the Riviera. Here palms, lemon, and orange-trees grow with the greatest luxuriance, and the fruit of the date palm almost attains maturity.'—Murray's *Handbook*. In recent years, it has begun to be resorted to by English visitors, and several new and excellent hotels have been erected. Pop. 11,000.

SAN ROQUE, a town of Spain, in the modern province of Cadiz, on the bay of Gibraltar, and eight miles north-north-west of the town of that name. The salubrity of the climate, and the cheapness of living, have attracted hither many foreign families, especially English. Pop. about 7000.

SAN SALVADOR, the smallest, though the second in point of population, of the Central American Republics (see AMERICA), consists of a strip of territory stretching along between Honduras and the Pacific, and bounded on the W. by Guatemala, and on the E. by Fonseca Bay, which separates it from Nicaragua. It averages 180 miles in length, by about 40 in breadth, and contains an area of 7230 English sq. m., with a population (according to the most recent estimate) of 600,000, or 83 to the sq. mile. The northern frontier is formed by a portion of the great Cordillera chain, and parallel to this range, and between it and the Pacific sea-board, runs another range of mountains along the whole length of the country, breaking it up into an inland valley, and a long low rich belt along the coast. This central range is highly volcanic in character, and has 16 volcanic peaks, ranging in height from 7386 to 4000 feet high. S. S. possesses numerous lakes, the largest of which is Guija, about 90 miles in circumference, and abounding in fish. The greater portion of the interior valley, and the alluvial strip lying along the coast, are of extreme fertility, and agriculture is extensively and successfully practised, to the almost total exclusion of pastoral pursuits. The principal agricultural products are indigo, sugar, and maize, cotton also being successfully cultivated in the districts around La Libertad and the Bay of Jiquilisco. The coast from Acajutla (30 miles from the western frontier) to La Libertad is known as the *Costa del Balsimo*, or Balsam Coast, as in the woods of this district is produced the famous balsam known as 'Balsam of Peru,' in such quantities that from 17,600 to 22,000 lbs. av. are annually exported. The mineral wealth of S. S. is not great, but rich veins of silver are found at Tabanco in the north-east, and mines of iron in the west near Santa Ana. S. S. has considerable export trade in indigo (which is known in trade as 'indigo of Guatemala,' and is reckoned the finest of all) and sugar, as well as turpentine, cocoa, cotton, and spices. In 1861, the value of exports amounted to about £578,620, and that of imports to £326,225; and in the same year 20 steamers and 21 sailing vessels, amounting to 24,554 tons, entered and cleared the ports of the republic.

The climate of S. S. is salubrious, and the temperature is lower than might be expected from the low latitude and general want of elevation of the country.

The population is composed of whites (of Spanish origin), Indians, *Ladinos* (of mixed white and Indian blood), negroes, and mulattoes. The whites form little more than one-fifth, the Indians one-third. The Indians are of the Aztec race, speak the Spanish language, and profess the Roman Catholic religion (the one established by statute), but retain many of their old heathen rites, and live in a certain degree apart from the rest of the population. They have the rights of citizens, but generally exercise them under the advice of the government. The government is carried on by a president, vice-president, and two ministers, one for foreign affairs and finance, and the other for internal business and war. The legislature consists of two chambers, an upper one of 12 senators, and a lower of 24 representatives. Education is well provided for, every village of 50 inhabitants being bound by law to support a school, and there is a university in the capital, San Salvador (q. v.), which is well endowed by the state. The standing army is 1000 men.

S. S. originally called *Cuscatlan*, 'the land of riches,' is said to have been, previous to the immigration of Europeans, the best peopled and most civilised country in America. It was conquered after a long and obstinate contest by Pedro de Alvarado, a lieutenant of Cortes, and under the Spanish rule was one of the most flourishing portions of the Guatemalan kingdom. In 1821, it threw off the yoke, and joined the Mexican Confederation, from which, however, it seceded in 1823. The several trials since made of a union among the Central American States have ended in the dissolution of all political connection; and S. S. is now an independent republic. In 1863, war broke out between S. S. and Guatemala, in which Honduras joined the former, and Nicaragua the latter. The result was the defeat of S. S., and the expulsion of the president from the country. A new president having been appointed February 20, 1864, tranquillity was gradually restored.

SAN SALVADOR, the capital of the republic of San Salvador, was founded in 1589, and supplanted an older town which had been built in 1528 by a brother of Pedro de Alvarado. It was the capital of the Union of Central America from 1823 till 1839. In 1854, it was a fine, well-built city, adorned with numerous splendid buildings, and containing a population of more than 30,000, but on the night of April 16th it was completely destroyed by an earthquake, and about 100 lives lost. In January 1855, it again became the seat of government, and its population is now above 16,000. The trade, which equally suffered, is gradually assuming its former flourishing condition, and is carried on mostly through the port of La Libertad, which is about five miles distant.

SANSANDING, a large town in the north-west of Africa, in Bambarra, about 20 miles north-east of Sego, on the left bank of the Niger, here called the Joliba. A considerable trade in salt, beads, coral, gold-dust, and cotton cloth is here carried on. Pop. from 10,000 to 11,000.

SANSCÂRA, or SANSKÂRA (lit. completing, perfecting), is the name of the ten essential rites or ceremonies of the Hindus of the first three castes. They are the ceremonies to be performed at the conception of a child; on vitality in the fœtus, in the fourth, sixth, or eighth month of pregnancy; and at the time of his birth, before dividing the navel string; the ceremony of naming the child on the tenth, eleventh, or hundred-and-first day; the ceremony of carrying the child out to see the moon on the third lunar day of the third light fortnight, or to see the sun in the third or fourth month; of feeding him in the sixth or eight month (or at other stated periods); the ceremony of tonsure in the second or third year; of investiture with the string in the

fifth, eighth, or sixteenth year—when he is handed to a *guru* to become a religious student; and the ceremony of marriage, after he has completed his studies, and is fit to perform the sacrifices ordained by his sacred writings.

SANSCR'IT, or **SANSKR'IT** (from the Sanscrit *sam* = Gr. *syn*, 'with, together,' and *kr'ita*, 'done,' with an epenthetic *s*, imparting greater emphasis to the sense of the compound; hence, 'thoroughly done, finished, accomplished') is the name of the ancient language of the Hindus; in which their whole sacred literature, and by far the greatest amount of their numerous ritual, legal, poetical, and scientific works, are written. S. belongs to that stock of languages commonly called the Indo-European, or Indo-Germanic, which includes the Indian, the Medo-Persian, the Græco-Latin, the Germanic, the Lithuanian-Slavonian, and the Gallo-Celtic families. It is therefore intimately allied to the ancient and modern languages comprised in each of these families, itself being the parent of the *Prâkr'it* (q. v.) dialects, the *Pâli* (q. v.), and the languages spoken in the north of India. Compared with the ancient languages kindred with it, S. has come down to us in a state of preservation and development so much superior to theirs, that it must be looked upon as the principal means which enables us to understand the affinity, and in general the linguistic laws which pervade the structure of these languages. The essay of Franz Bopp, *Ueber das Conjugationssystem der Sanskrit Sprache*, dated 16th May 1816, began a new era in the study of language. See PHILOLOGY, BOPP.

There are two great periods into which the history of the S. language may be conveniently divided: the first embracing the language as contained in the Vedic hymns (see VEDA); and the second, that represented by the so-called classical S., in which the epic works, the law codes, and the later literature are written. Between the two there is a transition period of the language, to which the Brâhman'a and ritual portion of the Vedas, and the Upanishads, may be assigned. In the language of the Vedic hymns, the grammar is less developed and much less settled than in the classical S.; it contains, moreover, many forms which at the second period became obsolete, or altogether disappeared from use; the structure of its sentences, too, is simpler, though it is more elliptical than in classical poetry. Another main difference between the two periods lies in the sense of its words. Though this is the same in many words of the Vedic hymns and the classical literature, still there are numerous words, which, though the same in form at both periods, have a sense which differs according as it belongs to the one or the other class of writings. The difficulty thus presented by the Vedic hymns is in a great measure removed by the commentators who explain the meanings of the Vedic words, and, in doing so, follow tradition, which, considering the peculiarities of Hindu history, and also internal evidence, is in all probability immemorial, and therefore the safest if not the only guide in the understanding of the oldest Vedic works. That their explanations may have become unsafe in some instances, would be but natural; but it is certain that these instances are the rare exceptions; and it is likewise certain that when modern Sanscritists—and several of these only imperfectly acquainted with S. grammar—have attempted to supersede those traditional meanings by interpretations which they suppose better suited to the context, or to some assumed etymology of their own, their rendering may better adapt the Vedic to the classical vocabulary, but is sure to falsify that understanding which the Hindu mind had of its oldest and most sacred works, and on which its further historical development is based. In the transition period of the Brâhman'a and ritual portion of the Vedas and the Upanishads, grammar and vocabulary offer similar difficulties to those of the Vedic hymns; but though for this reason the aid of the commentaries is likewise indispensable, they are much less numerous; and in those works of this extended period, which probably were composed at the classical epoch, the difference between the two is even inconsiderable. In comparing S. with other kindred languages, it is therefore necessary not to lose sight of these periods of the language, and of the peculiarities inherent in them.

SANSCRIT LITERATURE. The most natural, and, at the same time, the most scientific distribution of Sanscrit literature would be that according to the dates at which its writings were composed. The actual condition of Sanscrit philology, however, renders such a course impossible; for, with the exception of very few works, no date whatever is known to which they could be safely assigned. (See INDIA—*Religion*; VEDA.) In spite, therefore, of an apparent plausibility with which some authors have propounded a regular literary chronology of Sanscrit works, even with figures or dates appended to them, the general reader will do well to look upon all such dates as imaginary, and to rest satisfied with the hope, that perhaps future results of Sanscrit philology may afford a more satisfactory settlement of this vexed question of Sanscrit chronology. Under these circumstances, the only possible arrangement of Sanscrit literature is that suggested by their contents, irrespectively of the time at which they were composed, but, under each head, in that order which, within large margins, may be suggestive of consecutiveness.

1. *Religious Literature.*—It comprises, in the first place, the Vedas, and the mystical, philosophical, and ritual works connected with them (see VEDA and UPANISHAD); and secondly, the PURÂN'AS (q. v.) and TANTRAS (q. v.), besides prayer-books and smaller works, and treatises of less importance relating to the modern worship, based on the two latter classes of works.

2. *Law Literature.*—It is comprised under the name of *Dharmas'âstra* (from *dharma*, law—religious and civil—and *s'âstra*, book), and its origin is traceable to the ritual Sûtras relating to the Vedas. A complete Dharmas'âstra consists of three portions: the first treating of *Achâra*, or 'established rules of conduct,' comprising such matters as education, marriage, the funeral rites, the duties of a king, &c.; the second treating of *Vyavahâra*, or judicature, including law, private and criminal, and under the former, for instance, the law of inheritance and adoption; the third, on *Prâyas'chitta*, or penance, treating, besides this subject, also of impurity, the duties of a devotee, transmigration, and final beatitude. The chief extant representatives of this class are the codes of MANU (q. v.) and YÂJNAVALKYA (q. v.). Less complete than the latter—for it does not contain the Vyavahâra portion—is the code of PARÂS'ARA (q. v.); but it deserves special mention, as the modern Hindus consider it to have been especially composed for the requirements of the Kaliyuga, or the present mundane age, and as it is cited, therefore, as *the* authority, for instance, on the question, and in favour, of the remarriage of Hindu widows. For practical purposes, especially those concerning Vyavahâra, the chief actual authorities are the commentaries on Manu, *Yâjnavalkya*, and similar works, and the digests which have grown up from them. Amongst the former, the MITÂKSHARÂ (q. v.), by Vijnânes'wara, occupies the principal rank; and amongst the latter, the *Chintâman'i*,

Vîramitrodaya, *Vyavahâra-mayûkha*, *Smr'itichandrikâ*, and *Vyavahâra-Mâdhavîya*, which generally defer to the authority of the *Mitâkshará*; and, besides these, the *Dâyabhâga* of Jîmûtavâhana, which, like the *Dâyatattwa* of Raghunandana, differs from it on several important questions, for instance, on that relating to the hereditary rights of women. (See MITÂKSHARÂ.) As on the Vyavahâra, there are numerous smaller treatises on the Achâra and Prâyas'chitta.

3. *Poetical Literature.*—(*a.*) The two great epic poems. See RÂMÂYAN'A and MAHÂBHÂRATA.

(*b.*) *The Modern Epic Poems.*—Their subject-matter is entirely borrowed from the two great epic poems and other legendary works; and their only merit consists in the art bestowed by their authors on the versification, and all that relates to the æsthetical canon of Hindu poets, which, in some respects, may meet with the approbation of western critics, but, in others, would require in the European reader a total abnegation of his ideas of poetical beauty, in order to make these poems acceptable to him. Minute descriptiveness, elaborateness of diction, and an abundance of figures of speech, are some of the characteristics of these poems, amongst which those of Kâlidâsa approach nearest our standard of poetical worth. One of them, the *Bhattikâvya*, which relates to the history of Râma, was purposely composed for illustrating rules of grammar and formations of words of special interest. In another, the *Râghava-Pândavîya*, the ambiguity of the diction is so studied, that the poem may be interpreted as relating to the history of Râma, or other descendants of Das'aratha (see RÂMÂYAN'A), or to that of the descendants of Pân'd'u (see MAHÂBHÂRATA). The following are the *Mahâ-kâvya* or great poems of this class: the *Raghuvans'a* and *Kumârasambhava*, by Kâlidâsa (q. v.); the *Nalodaya*, also ascribed, though probably wrongly, to the same poet; the *Bhat't'i-kâvya*, or the poem by Bhat't'i; the *S'is'upâlabadha*, by Mâgha, hence also called the *Mâghakâvya*; the *Naishadîyacharita*, by S'rîharsha; the *Kirâtârjunîya*, by Bhâravi; and the *Râghava-Pân'd'avîya*, by Kavirâja (i. e., the prince of poets), as the author calls himself.

(*c.*) *Lyric and Erotic Poetry.*—Several works of this class are more of a descriptive character, and would differ therefore from what in European poetry might be included under this head. The principal works belonging to it are the following: the *R'itusanhâra*, or a description of the seasons, attributed to Kâlidâsa (q. v.); the *Meghadûta*, or the cloud-messenger, also supposed to have been written by Kâlidâsa—a poem in which a demigod, separated by fate from his wife, is imagined to make a cloud the messenger to her of his woes, and incidentally, as it were, describes his course over a large tract of India; the *Amarûs'ataka*, or hundred stanzas of Amaru, on amatory feelings and scenes, the natural sense of which commentators have twisted also into one of a mystical character, so as to make them appear less objectionable, especially as they were supposed by some to have been composed by the celebrated theologian S'ankara, when he had animated the dead body of King Amaru (see S'ANKARA); these stanzas have an epigrammatic character, and share in this respect the style of the first S'ataka, or hundred verses on love, by Bhartr'ihari; the *Bhâminîvilâsa*, by Jagannâtha Pan'd'itarâja, in four books, the second of which is connected with amatory subjects, while the third is a beautiful elegy on the death of the poet's wife; the *Gîtagovinda*, by Jayadeva, who probably lived in the 12th c., which, in ten sections, describes the amours of Kr'ishn'a with the cowherdesses, his separation from his wife Râdhâ, and his ultimate reconciliation with her, and which, like the *Amarûs'ataka*, has also been explained in a mystical sense, Kr'ishn'a then being represented as the soul which for a time becomes estranged from the supreme soul, its original source, but finally returns to it. This poem differs from those mentioned before in being intended for singing and for representation at a festival held in honour of Vishn'u; it combines the lyric and the melo-dramatic character.

(*d.*) *Didactic Poetry.*—A portion of this class of poetry may be included under the former head, since even such works as the *Amarûs'ataka*, and the erotic stanzas of *Bhartr'ihari* have much of the sententious character; another is contained in the episodes of the *Mahâbhârata*, and another forms a considerable portion of the books of fables. The chief special representatives of this class are, 'the three *S'atakas*,' or hundred stanzas on love, good and wise conduct, and renunciation of worldly desires, by *Bhartr'ihari*. Similar pieces of poetry are the hundred stanzas of *Chânakya*, and some stanzas in the anthology of *S'arngadhara*, called the *S'ârngadharapaddhati*. Others have been collected in various modern anthologies, such as the *Nîtisankalana* and the *Kavitâmr'itakûpa*. For the poem *Bhagavadgîtâ*, see under YOGA.

(*e.*) *Dramas.*—The plays of the Hindus are not numerous; they were only acted on special occasions, and the subject of the plot is with predilection borrowed from the legendary literature of ancient India. Hindu dramatists have little regard for unity of time, place, and action; and with the exception of Kâlidâsa, they must be considered as inferior in poetical worth to the renowned dramatic writers of ancient Greece and of modern Europe. Besides the reasons to be sought for in the religious, mystical, and metaphysical tendencies of the Hindu mind, a free development of the Hindu drama was probably also impeded by the heavy and artificial canon which weighed upon Hindu dramaturgy, and which, ascribed to sacred sources, and looked upon as a law not to be transgressed by any dramatic poet, did not allow much scope for poetical imagination, and would keep down any free movement upon which it might have ventured. The various kinds of dramatic performances, the number of their acts, the characters of the plays, the conduct of the plot, the sentiments to be represented, and even the modes of diction—all these were strictly regulated; so much so, that in spite of the differences which must exist between different authors and plays, there is still a kind of uniformity which pervades the whole Hindu drama, and must strike any one unacquainted with this elaborate dramatical canon. It must suffice here to mention a few of its peculiarities. All dramatic composition is divided, according to it, into two great classes—the *Rûpaka* or performance, and the *Uparûpaka*, or the minor *Rûpaka*; the former containing ten species, from the *Nât'aka*, or the play, *par excellence*, which represents exalted personages, down to the *Prahasana*, or farcical comedy; and the latter with eighteen species. Neither class contains the species 'tragedy'—which is incompatible with a belief in fate, one of the main features of the Hindu mind. Every drama opens with a prelude in the form of a dialogue between the stage-manager and one of his company, in which the name of the author and of his work, and such prior events as the spectators should know, are brought before the audience. The first part of this prelude is a prayer invoking the benediction of some deity in favour of the assembly. The piece thus being opened, is then carried on in the usual manner; but so long as the same act lasts, the stage is never left empty, but the entrance of a new personage is always announced by a special

person. The piece closes as it began, with a benediction. The principal characters of the play are the hero (*nâyaka*) and the heroine (*nâyikâ*). The former is either *lalita*, gay, thoughtless, and good-humoured; or *s'ânta*, gentle and virtuous; or *dhîrodâtta*, high-spirited, but temperate and firm; or *uddâtta*, ardent and ambitious; but as each of these categories is again subdivided, they become multiplied to 144 kinds. Equal minuteness is displayed in specifying the classes of the heroines. The hero has his antagonist in the *pratinâyaka*, or counter-hero; and each of these may have his officers, ministers, and friends. The heroine, on her part, has always a confidential companion, who is often her foster-sister. The subordinate characters are described as being eunuchs, mutes, dwarfs, foresters or barbarians. Two characters, however, deserve special notice, as being peculiar to the Hindu stage—the *Vit'a* and the *Vidûshaka*. The *Vit'a* may be the companion of a man or woman; he is generally on familiar, yet dependent terms, with his associate, and though somewhat like the parasite of the Greek comedy, yet not rendered contemptible; if a female, she is a courtesan. The *Vidûshaka* is the humble companion of a prince or man of rank; he is always lively, sometimes witty, and, according to the definition of his attributes, he is to excite mirth by being ridiculous in person, age, and attire. He is, curiously enough, always a Brâhman. The plays have eight, or, according to some, nine *rasa*, or characteristic flavours: these *rasas* are love, mirth, tenderness, fierceness, heroism, terror, disgust, wonder, and tranquillity; and they again consist of conditions with numerous divisions and subdivisions. The manner according to which the form of speech is regulated, is another peculiarity of the Hindu drama. Only the hero and the principal personages speak Sanscrit, but women—with rare exceptions—and the inferior personages speak Prâkr'it; the various, higher or inferior, idioms of that language being adapted to their higher or inferior character. See PRÂKR'IT. The oldest known Sanscrit drama is the *Mr'ichchhakat'i*, or 'the Clay Cart,' by King S'ûdraka, which, in the opinion of H. H. Wilson—who translated it in his *Select Specimens of the Theatre of the Hindus*—was written in the 1st c. B.C. Of other dramas may here be mentioned *Abhijnâna-s'akuntala* (see S'AKUNTALÂ) and *Vikramorvas'î*, by Kâlidâsa (q. v.), to whom also the drama *Mâlavikâgnimitra* is attributed; *Mâlatîmâdhava*, *Mahâvîracharita*, and *Uttararâmacharita*, by Bhavabhûti; *Ratnâvalî*, by S'rîharsha; *Mudrârâkshasa*, by Vis'âkhadatta; *Hanumannât'aka*, fabled to have been composed by the monkey Hanumat (q. v.); and *Anargharâghava*, by Murâri. A drama of a peculiar nature is the *Prabodhachandrodaya*, by Kr'ishn'a-mis'ra, who, in the opinion of Goldstücker, expressed in the preface to his translation of this drama, lived at the end of the 12th century. Its leading personages are all of a transcendental kind; such as the supreme spirit, faith in Vishnu, volition, organ of imagination, opinion, devotion, quietude, friendship, &c., on the one side; and error, egotism, hypocrisy, love, voluptuousness, anger, avariciousness, &c., on the other; and its object is to represent the victory of the former over the latter. The general dulness of the play is relieved by a number of sectarian worshippers, who appear on the scene, each eulogising the truth of his own religion, and ridiculing that of his antagonist. That this drama, which would baffle the patience of a European audience, was acted 'before King Kîrtivarman, who, with his whole assembly, was very eager to see it,' the poet relates in the prelude to it. An imitation of this drama is the *Chaitanyachandrodaya*, by Kavikarn'apura. For the translation of several of these dramas, and an account of others, see H. H. Wilson's *Select Specimens of the Theatre of the Hindus* (2 vols., London, 1835).

(*f.*) *Fables and Narratives.*—Fables, as such, occur, and are referred to, as early as in the great epic poems; but the oldest *collection* of fables is the *Panchatantra* (q. v.); and after it, the *Hitopades'a* (q. v.). These works are considered by the Hindus to belong to the class called *nîtis'âstra*, or works on conduct and polity, since the morals drawn from the fables, and expressed in sententious verses, with which they are interwoven, are the object for which these collections were made. A different class of writings are the ghost stories, merely composed for amusement, such as the *Vetâlapanchavins'ati*, or the 25 tales of the vampire; and the *S'ukasaptati*, or the 70 tales of the parrot; and the *Sinhâsanadvâtrins'ati*, or the 32 tales of the statues on the throne of Vikramâditya. A work of a higher order is the *Vr'ihatkathâ*, 'the Grand Tale,' or *Kathâsaritsâgara*, 'the Ocean for the Rivers of Tales,' by Somadeva of Cashmere. Amongst narratives of the romance class, the most celebrated are, the *Das'akumâracharitra*, or the 'Adventures of the Ten Princes,' by Dan'd'in, who lived about the middle of the 11th c., edited, with an elaborate preface, by H. H. Wilson; *Kadambarî*, by Vânabhatta; and the *Vâsavadattâ*, by Subandhu, a critical account of which work is given by Fitzedward Hall, in the preface to his edition of it (Calcutta, 1859).

(*g.*) *Chronicles.*—Historical works, in the European sense of the word, do not exist in Sanscrit literature. The same causes which have clouded all Hindu chronology, and even, at recent periods of Hindu history, have transformed historical facts into myths, seem to have rendered the Hindu mind indifferent to the research and the recording of *historical* truth. The only approach to historical works is found in some chronicles, though these, also, are not devoid of fictitious narratives. The most renowned among them is the *Râjataranginî* (q. v.), or the Chronicle of Cashmere, by Kalhana. A modern work of a similar kind, but of much smaller extent, is the *Kshitîs'avans'âvalîcharita*, or the Chronicle of a series of royal families who reigned in Bengal. It was composed in the middle of the last century.

4. *Scientific Literature.*—(*a.*) *Philosophy.* See the articles SÂNKHYA, YOGA, NYÂYA, VAIS'ESHIKA, MÎMÂNSÂ, VEDÂNTA.

(*b.*) *Grammar.*—That a scientific study of grammar was cultivated at a very early period of Hindu literature, is borne out by the testimony of the oldest glossator on the Vedas, YÂSKA (q. v.). The oldest extant work, however, on Sanscrit grammar is posterior to the work of Yâska; it is the grammar of Pân'ini (q. v.), which was criticised by Kâtyâyana (q. v.) in the *Vârttikas*, these, again, being commented on and criticised by Patanjali in the *Mahâbhâshya*. (See PÂN'INI, where some of the principal later works connected with his system are mentioned.) That the *Prâtis'âkhyas* (see VEDA) did not precede the grammar of Pân'ini, has been shown by Goldstücker in his *Pân'ini, his Position in Sanscrit Literature, &c.* Of authors of grammars, not following the technical system of Pân'ini, the principal are, Hemachandra, a Jaina (q. v.) writer, and Vopadeva, who probably lived about six centuries ago, and is especially esteemed in Bengal.

(*c.*) *Lexicography.*—It consists of glossaries of words and *dhâtus*—a term which may be vaguely rendered by 'roots,' or 'radicals,' though it does not imply, to the Hindu grammarian, the idea of a linguistic *element*—and of commentaries on these glossaries. The oldest known glossary of *Vedic* words—nouns and verbs—is the *Nirukta* (q. v.) of

Yâska. Renowned glossaries of *classical* words are the *Amarakosha*, by Amarasinha, who is probably not later than the 3d c. after Christ; the *Abhidhânaratnamâlâ*, by Halâyudha; the *Haimakosha*, by Hemachandra; and the *Vis'waprakâsa*, by Mahes'wara. (For other works of this class, see Wilson's *Sanscrit English Dictionary*, preface to 1st ed., 1819; and Colebrooke's *Miscellaneous Essays*, vol. 1. p. 50, ff.) The glossaries of *dhâtus* are called *Dhâtupât'has*. The oldest was probably composed by Pân'ini himself, and is the groundwork of the existing works of this name, though the latter contain numerous additions of later forms. The chief commentary on the *Dhâtupât'ha* is that by the celebrated Mâdhavâchârya (q. v.).

(*d*.) *Prosody*.—Sanscrit prosody admits three sorts of metre: one governed by the number of syllables, and which is mostly uniform, or monoschematic, in profane poetry, but not so in various passages of the Vedas; the other regulated by feet equivalent to two long syllables, or to four short; and the third regulated by the proportion of syllabic instants, without noticing the number of feet. Some Sûtras (q. v.) connected with the Vedas contain rules on the Vedic metres; but the principal work on Vedic as well as profane prosody is the *Chhandah's'âstra*, by Pingala, which has been commented on by various writers, the most conspicuous of whom is Halâyudhabhat't'a. A short treatise on prosody, which only exhibits the most common sorts of metre, the *S'rutabodha*, is attributed, but probably wrongly, to Kâlidâsa (q. v.).

(*e*.) *Art of Poetry*.—It is treated in works on dramaturgy, and works on the poetical art in general. The oldest work on the dramatic art is the *Sûtra* of Bharata; a later one is the *Das'arûpa* by Dhananjaya. Some of the principal works of the latter category are the *Kâvyaprakâs'a*, by Mammat'a, the *Kâvyâdars'a*, by Dan'd'in, and the *Sâhityadarpan'a*, by Vis'wanâtha Kavirâja. Several other works of this class are especially concerned in the explanation of figures of speech.

(*f*.) *Works on Music*.—In general, they treat of notes, musical scales, melodies, the art of singing, and musical instruments; and some of them also of the art of dancing and performing. The melodies, or *Râgas*, are represented as deities, who have wives, the *Râgin'îs*. Their number is uniform in the different works, and it is probable that the passages in dramas and other poetical works intended for singing were written to suit these fixed melodies, and not that the melodies were composed after the poet had performed his task. The principal works of this kind are the *Sangîtaratnâkara*, by Sârngadeva, the *Sangîtadarpan'a*, by Dâmodara, and the *Sangîtadâmodara*, by S'ubhankara. Special treatises relate to the melodies alone.

(*g*.) *Amatory Art*.—Works treating of this art purport methodically to explain and to classify all that relates to love, and they refer for many of their statements to the oldest authorities. The chief work on this subject is the *Kâma-Sûtra* of Vâtsyâyana.

(*h*.) *Astronomy and Arithmetic*.—The calendars connected with the Vedas are the earliest evidence of Hindu proficiency in astronomy; they presuppose a knowledge of a solar year of 365 days, and their date is assumed by Colebrooke to belong to the 13th c. B. C., while others would place them a few centuries later. The scientific works of later Hindu astronomers are professedly based on five ancient systems, or Siddhântas, called the Paulis'a-, Romaka-, Vâsisht'ha-, Saura-, and Paitâmaha-Siddhânta; and the earliest renowned author among these astronomers is Âryabhat't'a, who, according to Colebrooke's calculation, did not live later than the 5th c. after Christ. From the quotations by Brahmagupta, it appears that Âryabhatta 'affirmed a diurnal revolution of the earth on its axis, that he possessed the true theory of the causes of lunar and solar eclipses, and that he noticed the motion of the solstitial and equinoctial points, but restricted it to a regular oscillation, of which he assigned the limit and the period.' See, for further detail, Colebrooke's *Algebra*, &c. (Lond. 1817, p. 38). His principal work, the *Âryâsht'as'ata*, is at present only known from the quotations of Brahmagupta, Bhat't'otpala, and others; but his other works, the *Das'agîtikâ* and *Âryabhat't'îya*, are extant. Varâhamihira, the next important astronomical writer, a native of Ujjayinî, lived about the beginning of the 6th c. after Christ. His compilation of the five Siddhântas, the *Panchasiddhântikâ*, is not yet recovered; but several of his astrological treatises, and the scholia on them by Bhat't'otpala or Utpala are preserved, and his *Br'ihatsanhitâ* has been recently edited by Dr H. Kern (Calc. 1865). Another great astronomical authority is Brahmagupta, who appears to have written towards the close of the sixth, or the beginning of the following century; his work bears the title of *Brahmasiddhânta*, and it was followed up by Bhâskara, who, in the middle of the 12th c., composed a celebrated work, the *Siddhântas'iroman'i*, translated by Lancelot Wilkinson (Calc. 1861). The *Sûryasiddhânta* has been edited by Fitzedward Hall (Calc. 1859); and two translations of it are due, one to E. Burgess, in the *Journal* of the American Oriental Society, accompanied with notes by Whitney (New Haven, 1860); another to Bâpûdeva S'âstri (Calc. 1861); but whether this Siddhânta is the Saura, one of the five original Siddhântas above mentioned, or a later work bearing a similar title, is matter of doubt. That Hindu astronomy is largely indebted for its progress to the kindred sciences of western nations, may be inferred from the occurrence in Sanscrit of terms which are of Arabic and Greek origin. Thus, the terms *horâ*, *dreshkân'a*, *liptâ*, *kendra*, &c., are easily traced to the Greek *hōra*, *dekanos*, *lepta*, *kentron*, &c.—That works on Hindu astronomy contain more or fewer chapters or passages which no longer concern astronomy, but belong to the sphere of astrology, can be no matter of surprise, considering the intimate connection in which, in India, religion and superstition stand to every branch of human knowledge, and much more especially to one concerning the heavenly bodies.' There are, moreover, numerous works which are purely astrological, merely treating of nativities and the influence of the planets on certain periods of the day or month, and the occurrences that would take place at them. Among celebrated writers on algebra, it must here suffice to name Varâhamihira and Bhâskara. See Colebrooke's *Algebra*, as quoted above.

(*i*.) *Medicine*.—The origin of Hindu medicine is referred to the god Brahman, from whom the Âyurveda, or 'the science of long life,' was obtained by Daksha, who communicated it in his turn to the As'wins. Some time after this, mankind, in consequence of their wickedness, becoming afflicted with numerous diseases, the Munis, or saints, met in the Himalaya Mountains to search for a remedy. A long list of these saints is given by *Charaka*, one of the greatest medical writers, and it is so far of interest as it contains several names known in Hindu history, and which thus may be probably connected with the early study of Hindu medicine. The two greatest medical authorities the works of whom are still extant are *Charaka* and *Sus'ruta* (q. v.).

Both treat of the duties of physicians and their pupils, of anatomy and physiology; hygeology; materia medica, pharmacy, and preparations of medicine; surgery; the diagnosis, prognosis, and treatment of a considerable number of diseases; midwifery, toxicology, &c. Several chapters in them are devoted to omens and portents, as well as to the evil influence of planets and demons on the human body. Charaka, who is older than Sus'ruta, contains more mythological detail than the latter.

Of the authorities quoted by Charaka, Âtreya seems still preserved in a work, the *Âtreyasanhitâ*, which is far less scientific and complete than either the work of Charaka or Sus'ruta, and therefore appears to have preceded them.—See also T. A. Wise, *Commentary on the Hindu System of Medicine* (London, 1860).

(*j*). *Architecture*.—Treatises on architecture, sculpture, &c., are collectively called *S'ilpas'âstra*. There appear to have been 32, or, according to some, 64 standard treatises on these arts, but of these only a few are probably still in existence. The most important of them is the *Mânasâra*, which consists of 58 chapters, each of which is devoted to a particular topic—such as measures used in architecture; the different sites to be selected for building temples and houses; the mode of determining the different points of the compass; the several sorts of villages, towns, and cities, with directions for building them; the different parts of an edifice, its ornaments, pedestals, bases, pillars, &c.; the various sorts of temples; the construction of porticoes, gates, palaces, &c.; the construction of images, and cars in which the gods are carried in procession, together with the ceremonies attending the consecration of images; the mode of determining the propitious moment for commencing to lay the foundation of an edifice, &c. See, for further detail, Râm Râz, *Essay on the Architecture of the Hindus* (London, 1834).

For a more copious supply of titles of books on the subjects mentioned, the reader may consult Gildemeister, *Bibliotheca Sanscrita*, Bonn (1847), and the printed catalogues of the Library of the India Office, of the Sanscrit MSS. of the Bodleian Library at Oxford, and of the Sanscrit MSS. of the Royal Library at Berlin.

SANSCULOTTES, i.e., 'without breeches,' was the name given in scorn, at the beginning of the French Revolution, by the court party to the democratic 'proletaires' of Paris. The latter accepted this superfine reproach with sardonic pride, and the term soon became the distinctive appellation of a 'good patriot,' more especially as such a one often made a point of shewing his contempt for the rich by neglecting his apparel, and cultivating rough and cynical manners. As the noblesse prided itself on an illustrious pedigree, so the genuine child of the revolution boasted that he was come of a long line of—notoless sansculottes; that his

'Ancient but ignoble blood
Had crept through scoundrels ever since the flood.'

Towards the close of the Convention, the name, connected as it had been with all the sanguinary excesses of the period, naturally fell into bad odour, and soon after totally disappeared; nor do the French appear to wish that its memory should be preserved, for they have not given it a place in their Encyclopædias.

SAN SEBASTIA'N, a rising seaport city in the north of Spain, capital of the Basque province of Guipuscoa, 381 miles north-north-east of Madrid by the North of Spain Railway. It is built on a peninsula, at the southern base of a conical hill, called Mont Orgullo, 400 feet high, commanding a most striking view, and crowned with a castle strong enough to have obtained for itself the name of the Gibraltar of the north of Spain. Since its almost total destruction during the Peninsular War, the town has been rebuilt on a regular rectangular plan. The streets are narrow, and are bordered by high houses, and having curtained balconies in front. On the east of the town is a confined gulf, formed by the embouchure of the Urumea; and on the west is a magnificent roadstead, protected against enemy and tempest by the isle of Santa-Clara, and a series of rocks, which offer to vessels only a narrow and dangerous pass. The roadstead is bordered by a beautiful shore, which, on account of its suitability as a watering-place, attracts visitors from all parts of the country. The town communicates with the mainland by a narrow tongue of land, and by a bridge leading across the Urumea, and connecting S. S. on the peninsula with the railway station on the mainland. By means of the North of Spain Railway, which was inaugurated by the king of Spain, 15th August 1864, the town is placed in direct communication with Madrid and Paris. S. S. is the seat of an increasing commerce. In 1863, 2112 vessels (including those engaged in the coasting-trade), of 152,474 tons, entered and cleared the port. The exports consist principally of wool, flour, wine, cutlery, firearms, copper-ore, and lead; the imports are salted fish, sugar, silk and cotton and linen goods, cocoa, machinery, coffee, timber, and iron-wares. In 1863, coal, coke, wagons, rails, &c., for the new railway, were imported from Great Britain, France, and Belgium to the value of £538,706. Pop. estimated at 19,000, but probably more.

S. S. has suffered from numerous sieges in the wars between France and Spain. It was captured by the Duke of Wellington in 1813, when the dispossessed French garrison set it on fire.

SAN SEVERI'NO, a city of Central Italy, province of Macerata, 15 miles west-south-west of the city of that name. It is well built, and has handsome palaces, the finest of which are the Palazzo Comunale, and that of the bishop. The neighbourhood produces exquisite wine, oil, and fruit, and cattle are reared on the pasture grounds. Pop. 13,898.

SAN SEVE'RO, a city of Southern Italy, province of Foggia, with 18,000 inhabitants, stands in a delightful and fertile open country, producing abundance of grain, tobacco, and wine, and affording rich pasturage. It was once remarkable for the industry and activity of its population, but its commerce has been greatly injured, and its lands devastated, by years of brigandage.

SANTA ANNA, DON ANTONIO LOPEZ DE, ex-president of Mexico, was born in Jalapa, in 1798. While a mere youth, he entered the Spanish army, and became lieutenant-colonel in 1821. When Mexico determined to throw off the Spanish yoke, S. A. greatly distinguished himself at the head of the Mexican troops. The Spanish royalists were expelled from Vera Cruz, and he was elected governor of the city and province. Iturbide had established an imperial rule over Mexico (q. v.), but his tyranny having worked his downfall, S. A. proclaimed, in 1822, a Mexican republic, which was recognised by every foreign state except Spain. He was incessantly engaged in quelling the civil wars kindled by the aristocratic and democratic factions. In 1829, he engaged and put to flight a division of Spanish troops which invaded Mexico by way of Tampico, with the view of again bringing Mexico under Spanish rule. The separation of Texas (q. v.) from the Mexican union was vigorously but

unavailingly opposed by Santa Anna. In 1837, differences arose with France, and a division of French troops landed at Vera Cruz. They were gallantly engaged by S. A., who drove a portion of them into the sea at the point of the bayonet. In this action he received a bullet in the leg, which rendered the amputation of the limb necessary. In 1838, the French took Vera Cruz, and obtained the settlement of their differences. In 1847, war having been declared by Mexico against the United States, S. A. took the command of the Mexican forces. He offered a gallant but ineffectual resistance to the troops of Generals Scott and Taylor. The city of Mexico having been stormed and taken by the Americans under General Scott, the war was at an end, and S. A. retired from Mexico. During 30 years he had disputed the direction of affairs with Bustamente, Herrera, Cevallos, and other chiefs of parties, being at one time dictator, and at another disgraced and an exile. In 1853, Mexico, torn by civil dissensions, and falling into anarchy, again recalled Santa Anna. He declared himself president for life, and a civil war was the immediate result. In 1855, he was driven from the country. During the government of Juarez, 1858—1863, S. A. was looked up to as their chief and future ruler by an influential party in Mexico; but the French occupation, and the establishment of a constitutional hereditary monarchy under the Emperor Maximilian of Austria, now render his return to power extremely problematical. He is regarded by his countrymen as their ablest general, and although he is chargeable with unjustifiable cruelties in suppressing some insurrections, he has been more successful than any other Mexican ruler in quelling the civil wars that have brought the country to its present miserable situation. He is also accused of being greedy of wealth, and unscrupulous in the means of obtaining it. In February 1864, he returned to Mexico. Before landing at Vera Cruz, he signed an act of adhesion to the empire. Next day, in violation of this engagement, he addressed a proclamation to the Mexican nation, styling himself the conqueror of Tampico, and alluding to the time when he presided over the destinies of the country as the golden age of the Mexican republic. The regency considered this proclamation an appeal to the passions of the people, and ordered the general back to the Havanna, where he still (1865) resides. He has received the Grand Cross of Charles III. of Spain, and the Grand Cross of the Red Eagle of Prussia.

SANTA CRUZ (Teneriffe), the capital of the Canary Islands (q. v.), and the chief seaport of the group, stands on the north-east side of the island of Teneriffe. Its port, the safest in Canaria, is at present (1865) being extended and improved by the construction of two moles, with a united length of about 5400 feet, which will enclose a large space of water, affording excellent anchorage in from two to nine fathoms. When completed, these works will be of inestimable value, in a commercial point of view, to the island. The streets of S. C. are broad, the houses whitewashed and flat-roofed, and several of the public buildings striking in appearance. The town is defended by several forts and redoubts. Formerly, large quantities of wine of excellent quality were grown in Teneriffe, and shipped for export at S. C.; now, however, the principal article of export from this, and also from the other islands, is cochineal. Coals from England, together with manufactured goods, hardware, and furniture are imported. Of the imports at S. C., more than a third come from England, and the whole imports in 1862 amounted to £159,360. Pop. 13,228.

SANTA CRUZ. See VIRGIN ISLANDS.

SANTA CRUZ DE LA PALMA, the capital of Palma, one of the Canary Islands (q. v.). It stands on the east coast of Palma, on a spacious bay from 7 to 10 fathoms deep. Pop. about 5000, employed partly in manufactures of silks and hosiery.

SANTA FÉ, city and capital of the territory of New Mexico, U.S., built among the Rocky Mountains, on a plain 7047 feet above the sea. It is an old Spanish Mexican town, and contains two Roman Catholic churches and the government buildings. It has an active overland trade with St Louis. Pop. in 1860, 4630.

SANTALA'CEÆ, a natural order of exogenous plants, mostly trees and shrubs. The leaves are undivided, sometimes minute. The perianth is superior, 4–5-cleft. The stamens are 4 or 5, opposite the segments of the perianth, and inserted into their bases. The ovary is 1-celled, with 1—4 ovules. The fruit is 1-seeded, nut like, or drupaceous.—There are about 110 known species, natives of various parts of the world, the European and most of the North American species being obscure weeds, whilst the trees of the order occur chiefly in the East Indies, New Holland, and the South Sea Islands. SANDAL-WOOD (q. v.) is the produce of plants of this order. The leaves of *Osyris Nepalensis* are used for tea. Some species are used in medicine in their native countries. *Fusanus acuminatus* is the Quandang Nut of New Holland. Its taste and qualities resemble those of Sweet Almonds, as do also those of the seed of the *Cervantesia tomentosa* of Peru. *Pyrularia oleifera*, the Buffalo Tree or Oil Nut, has a large seed, from which, in the Southern States of America, oil is obtained.

SA'NTALIN, or **SANTALIC ACID**, the colouring matter of *Pterocarpus santalinus*, or red sandal-wood, is readily obtained by digesting the rasped wood in alcohol, and then precipitating the santalin by the free addition of water. It is little used in this country as a dye-stuff, but it is employed in India both in dyeing silk and cotton. It is in consequence of the santalin contained in it that red sandal-wood is retained in the *Pharmacopœia* as a colouring agent for tinctures, &c.

SANTA MARGHERI'TA DI BELI'CÉ, a city of Sicily, in the province of Girgenti, with 9232 inhabitants. From the lands belonging to it, grain, wine, and oil are exported. Woven goods and hats are manufactured for export.

SANTA MARGHERITA DI RAPA'LLO, a commune of the province of Genoa, delegation of Rapallo, situated on the sea-coast. Pop. 6054. It has a garrisoned castle close to the sea. Its seafaring men go to fish for coral on the shores of Sardinia and Africa. Consuls from Turkey, Egypt, and Tripoli reside here.

SANTA MARI'A DI CA'PUA-VETERE, a city of Southern Italy, in the province of Terra di Lavoro, with 19,023 inhabitants. It is not handsome but new, and its population increases every year. The neighbouring soil is very fertile, and produces abundance of grain, fruits, oil, and excellent wines. Its manufactures consist of cloth and other woven materials and hats.

SANTA MAU'RA, or **LEUCA'DIA** (anc. also *Leucadia* and *Leucas*) so called from its white cliffs), one of the Ionian Islands, off the west coast of the ancient Greek province of Acarnania, from which it is now separated by a passage about a mile wide, although it was in early times connected with the mainland by an isthmus. The canal across the isthmus, which converted the peninsula into an island, is said to have been cut by the Corinthians. S. M. is about 22 miles long, and has a breadth

ranging from 6 to 9 miles. Area about 180 sq. m.; pop. 20,147. Its surface is very uneven. It is traversed by a range of hills from north to south, which end at the southern extremity in the high white cliffs called by the Italian sailors of the Levant Cape Ducato (a corruption of *Leucates*), but better known under the name of 'Sappho's Leap.'

SANTA'NDER, an important and thriving seaport of Spain, in the modern province of the same name, stands on a magnificent bay, an inlet of the Bay of Biscay, about equally distant from Oviedo on the west, and San Sebastian on the east. The bay on which the town is placed is from two to three miles wide, and about four miles long, and is accessible to the largest vessels at all times of the tide. The situation of the town, on a headland protected by a hill, is picturesque; among its edifices few are either interesting from their appearance, or important from their character. Of its former convents one now serves as a theatre; another as a cigar-factory, giving employment to about 1000 people. Numerous new houses, and handsome warehouses, and commercial establishments of various kinds have been erected recently. The fine harbour of S., with a commodious entrance, is accessible at all tides, and unobstructed by a bar. Several important improvements have taken place here since 1862. The half of the province of S. may be said to be impregnated with iron, copper, zinc, and other ores; though, hitherto, the timidity of native capitalists has rendered the quantity extracted comparatively small. In 1863, 12,625 tons of iron and copper ores, together with a quantity of quicksilver and cobalt, were shipped from the port of S. to Great Britain alone, and mostly to Newport and Swansea. Wheat is an important element in the trade of Santander. The exports, in 1861, amounted to £1,320,363; and in that year, wheat and flour were exported to the value of £1,305,135. The imports the chief articles of which were sugar from Cuba; textile fabrics from England, France, Belgium, and Germany; and salted cod-fish from Norway - amounted, in 1863, to £1,744,202. A railway runs south from S. to Venta de Banos on the great North of Spain Railway; and in the middle portion of it, from Barcena to Reynosa, a distance of 21 miles, there are 22 tunnels. Pop. (1863) 32,600.

SANTARE'M, an interesting old town and river-port of Portugal, on the right bank of the Tagus, 46 miles north-east of Lisbon by railway. It carries on an active trade in the products of the fertile vicinity with Lisbon, with which there is steam-communication by river as well as by rail. Pop. about 8000.

SANTEE', a river of South Carolina, U.S., which rises in the Blue Ridge, in North Carolina, by two principal branches, the Congaree and Wateree, and flowing south-east, empties into the Atlantic Ocean. Lat. 33° 6'. It is navigable 150 miles to Camden, and is bordered, in its lower course, by rice-swamps and pitch-pine forests.

SANTERRE, ANTOINE JOSEPH, a French revolutionist, who for some time exercised an influence quite disproportioned to his feeble abilities, was born at Paris, 16th March 1752. He followed the trade of a brewer in the Faubourg Saint-Antoine, and his wealth, probity, and generosity towards his *employés* gave him an immense influence in the district. On the establishment of the National Guard in 1789, he received the command of a battalion, and took part in the storming of the Bastile. During the year 1792, the Jacobin agitators of the faubourgs often met in the brewery of S., and it was there that the *émeute* of the 20th June was preconcerted, on which occasion S., along with Saint-Huruge, marched at the head of the mob who invaded the Assemblée Nationale, and turned out the Girondists. He also played a conspicuous part on the 10th of August, when he was invested with the dignity of general-commanding of the National Guard. In October he was named Field-marshal (*Maréchal de Camp*), and in April 1793 he got the 'authorities' to let him off scot-free for a debt of some 50,000 livres, which he owed the exchequer in the shape of taxes on the beer manufactured by him—the minister of finance arguing that, inasmuch as S.'s beer was drunk for the most part by 'patriots' (not always careful to pay their score), it ought not to be subjected to 'duty.' But greater things were yet in store for the privileged brewer. On the 30th of July, he was appointed a general of division in the French army, and wishing to do something to justify this strictly military office, he marched at the head of 20,000 men against the Vendéan royalists, but was miserably beaten, and in consequence recalled. Shortly after, he was arrested and imprisoned, and only obtained his liberty after the death of Robespierre. He then withdrew into private life; but his fortunes and his popularity alike declined, and in 1800 we find him begging money and employment from Bonaparte. The latter, who saw clearly enough that S. was intrinsically an incapable fool, declined to employ him, but restored him to his military rank. S. died 6th February 1809. Owing to the calumnies of royalist writers, S. commonly figures as one of the ferocious monsters of the Revolution. There is positively no evidence, however, for such an opinion. Though he was hugely fond of 'brave words,' and menaced his opponents with all the bellicose grandiloquence of a French revolutionist, he was nearly as soft in the heart as in the head. Some witty contemporary made the following epitaph on him:

Ci-gît le général Santerre.
Qui n'eut de Mars que la bière.

SANTIAGO, the largest of the Cape Verd Islands (q. v.).

SANTIA'GO DE CHI'LI, capital of the republic of Chili, and of a province of the same name, an archbishop's see, and the seat of the supreme government, stands at the western base of the Andes, 1800 feet above sea level, and 90 miles east-south-east of Valparaiso. It was founded in 1541 by Pedro de Valdivia, but it has only recently acquired importance. Its climate is delightful; the plain on which it stands is extensive, and fertile in vines, figs, melons, and other fruits, and the scenery, looking towards the range of the Andes, is of the grandest description. The valley or plain of S. is sprinkled with tasteful villas and well-cultivated farms. The city is arranged in squares, and the houses are generally low, and are built around a court or garden, which is intended as a place of refuge during the earthquakes that frequently occur here. But of late years it has become the fashion, in spite of the earthquakes, to build costly houses of two, three, and even four stories, with a façade towards the street. The Alameda, shaded with poplars, and cooled by two streams of running water, is a pleasant promenade. The Mint, a portion of which serves as one of the president's palaces, and as offices for the ministers, is the handsomest of the public buildings, many of which, however, are beautiful structures. The university comprises the five faculties of philosophy, mathematics and physical sciences, medicine, law, and theology. There are important educational institutions (including a normal school), and a library

and museum. On the west side of the great square, which is adorned with a fine fountain, is the cathedral. On December 8, 1863, one of its churches, that of La Compania, was destroyed by fire during service, and 2000 out of the 3000 of the congregation—the victims being mostly women—met a dreadful death. Gold, silver, and lead are exported, and the imports are chiefly manufactured goods, wines, and spirits. The chief trade is with Valparaiso by the Valparaiso and Santiago Railway, which was opened in September 1863. Pop. 107,000.

SANTIA'GO DE COMPOSTE'LLA, an important and once famous city of Spain, formerly the capital of Galicia, and, from the number of pilgrims by whom it was annually visited, the Mecca of Spain, is extremely picturesque in appearance, from its hill-girt situation on an irregular uneven site, 40 miles south of Coruña. The cathedral, occupying the site of a former edifice of the same nature, was founded in 1082, and its buildings, comprising a cloister, the archbishop's palace, &c., cover more than three and a half acres. The great square is a spacious area, and occasionally used as a bull arena. In front of the town-house is an equestrian statue of Sant Jago (St James the Elder, the patron saint of the city and of Spain), whose body, according to a monkish legend, was discovered near this by a hermit—a star miraculously pointing out the spot, whence the name Compostella (*campus stellæ*, 'field of a star'). It was removed to Santiago in 829. The bones of the saint are believed by the people to be built into the foundations of the cathedral. A desolate appearance is imparted to the town from the number of tenantless and ruined nunneries and convents which it contains. Leather is manufactured, and the making and carving of small silver graven images employ a number of silversmiths. Pop. about 30,000.

SANTIAGO DE CU'BA, formerly the capital of the island of Cuba, and now the chief town of the eastern department of the island, stands on a bay on the south coast at the mouth of a stream of the same name. It is hemmed in by mountains, and is reputed the most unhealthy place in the island. Its harbour is deep, well protected, and fortified. It communicates by railway and telegraph with the other towns of the island. As a seat of commerce, it takes rank after Havana and Matanzas. Pop. 26,000.

SA'NTONIN ($C_{30}H_{18}O_6$) is a vegetable principle possessing slightly acid properties, obtained from the seeds and flower-heads of several species of *Artemisia*. The British Pharmacopœia gives *Santonica*, 'the unexpanded flower-heads of an undetermined species of artemisia,' imported from Russia, as its source. It is one of the most efficacious of the class of medicines known as anthelmintics or vermifuges, the most obstinate cases of ascarides and lumbrici almost always yielding to its prolonged use. Pure santonin may be given in powder combined with scammony or rhubarb, the dose being from half a grain to two grains, according to the age of the child. The French prescribe it in the form of lozenges made with white sugar and mucilage; they are readily obtained in this country, and usually act satisfactorily. Küchenmeister, one of the highest authorities on the subject of intestinal worms, prefers the use of santonate of soda, which he obtains by digesting an alcoholic solution of santonin with carbonate of soda, evaporating and crystallising. The dose is from two to eight grains mixed with sugar. Two very peculiar symptoms occur after the administration of santonin. The urine often acquires a reddish tint, which may give rise to an unfounded suspicion of the presence of blood in that fluid; and under its influence, vision becomes remarkably affected for a few hours, every object appearing either yellow or green to the patient. No satisfactory explanation of the latter phenomenon has yet been given.

SA'NTOS, one of the chief ports of the province of São Paulo (q. v.) in Brazil, 34 miles south-south-east of the city of São Paulo, of which it is the port. It stands on the northern side of the island of Engua Guaçu, and commands a fine bay. Sugar, coffee, and other products of the interior are transported to S. by troops of mules; and salt, flour, and other imported goods find their way back by the same means. It is stated that 200,000 mules arrive here laden during the year. 160,000 sacks of coffee are exported annually. Pop. stated at 8000.

SAN VICE'NTI. See SAN SALVADOR.

SÃO FRANCI'SCO, a large river of Brazil, rises, as the Paraopeba, in the province of Minas Geraes, in lat. about 20° 40′ S.; long. 43° 25′ W. It flows north, north-east, and east, and in its lower course it separates the provinces of Bahia and Sergipe from Pernambuco and Alagoas. Its first considerable affluent is the Rio das Velhas, which joins it from the right in lat. 17° 45′ S. Above the junction of the Velhas, at Pirapora, where the river is 1782 feet broad, and 1700 feet above sea-level, there is a fall of 17 feet. From the mouth of the Velhas (1666 feet above sea-level) to the falls of Paulo Affonzo, the river is navigable for 920 miles; and from these falls to the mouth of the river, a distance of about 140 miles, it is navigable for larger vessels and steamers. Its entire length is 1652 miles, and its breadth at its mouth is 3486 feet.

SAÔNE, a river of France, an affluent of the Rhone (q. v.), rises in the dep. of Vosges, at Vioménil, in the Faucelles Mountains, at the height of 1476 feet above sea-level, and flows south past Gray, Châlons, and Maçon to its confluence with the Rhone at Lyon. Entire length, 312 miles, of which 170 miles are navigable.

SAÔNE-ET-LOIRE, a dep. of France, bounded on the E. by the dep. of Jura and the river Saône, and on the W. by the dep. of Nievre and the river Loire. Area, 3303 sq. m.; pop. (1862), 582,137. The country consists for the most part of vast and fertile plains, separated by rich vine-clad hills. The fertility is greatest in the vicinity of the two main streams. Horses of a small but vigorous breed are reared; the excellent and abundant pasturage supports numerous herds. The wines, of which 15,400,000 gallons are made annually, are well known as *vins de Mâcon*. Agriculture, iron-mining, and manufactures of cotton fabrics, leather, pottery, fire-arms, &c., are all actively carried on. The dep. was formed in 1790 out of four districts of the ancient province of Burgundy—Maconnais, Charollais, Chalonnais, and L'Autunois. It now forms five arrondissements, of which Mâcon is the capital.

SAÔNE, HAUTE, a dep. in the north-east of France, bounded on the N. by the dep. of Vosges, and on the E. by that of Haut-Rhin. Area, 2061 sq. m.; pop. (1862), 317,183. About one half of the entire area is in cultivable land, and more than a fourth part, comprising the north and north-east districts, is covered with forest-clad mountains. In the south and south-west, are fertile plains, bounded by hills, covered with vines or timber. The climate of this rich champaign district, with its bulwark of mountains against the north and north-east winds, is remarkably mild and healthy. Sheep, including some flocks of the merino breed, and cattle are reared in large numbers. Fruits are

largely cultivated; and 6,600,000 gallons of wine and 220,000 gallons of brandy are made annually. The arrondissements are Gray, Lure, and Vesoul, and Vesoul is the capital.

SÃO PAULO, a southern maritime province of Brazil, bounded on the N. by the province of Minas Geraes. Area, 169,050 sq. m.; pop. (1856), 500,000. Its coast-line—part of which in the north-east is high and rocky, though the rest is low—is about 400 miles in length. Sugar, coffee, rice, millet, and tobacco are staple crops; horses, cattle, and swine are reared for export; and among the minerals are the precious metals and gems. There are several commodious harbours, and the capital is São Paulo.

SÃO PAULO, a city of Brazil, capital of the province of the same name, stands on an uneven elevation between two small streams, tributaries of the Tiete, 220 miles west-south-west of Rio de Janeiro. There is an Academy of Laws, attended by about 500 legal students. The general appearance of the town is picturesque, and the vicinity and suburbs are beautiful. Pop. stated at 22,032.

SÃO PEDRO DO RIO GRANDE. See RIO GRANDE DO SUL.

SAP, the fluid which circulates in plants, and is as indispensable to vegetable life, as the blood to animal life. Entering by the roots of the plant (see ENDOSMOSE), it ascends through the cells and vessels of the stem, proceeding to the surface of the leaves and utmost extremities of the system, and having been exposed, chiefly in the leaves, to the influences of air and light, returns through the bark, a portion ultimately reaching the root and being excreted there, whilst another portion probably enters again into circulation with the new fluid entering from the soil. See CIRCULATION OF SAP. Sap in its most simple state, the ascending or crude sap, consists chiefly of water, mucilage, and sugar; the elaborated sap varies much more in its properties in different plants, forming the peculiar juices of the plants. The elaborated sap always contains much less water than the ascending sap. Plants seem to derive their supply of sap not only from the soil by their roots, but also from the atmosphere by the Stomata (q.v.) of their bark and leaves; and some, especially succulent plants, are capable of existing and increasing in size although entirely severed from the soil. The ascending sap appears to find its way through the whole wood of the stem in ligneous plants, but chiefly through the alburnum or sap-wood. The elaborated sap has been named LATEX (q. v.).—The ascent of the sap is one of the most wonderful phenomena of spring, and seems to depend not so much on the state of the weather, for it begins in the depth of winter, as on the plant having had its sufficient period of repose, and being therefore constrained by its very nature to renewed activity.

SAP, in Military Engineering, is a narrow ditch or trench, by which approach is made from the foremost parallel towards the glacis or covert-way of a besieged place. The sap is usually made by four sappers, the leading man of whom rolls a large gabion before him, and excavates as he progresses, filling smaller gabions with the earth dug out, and erecting them on one or both sides to form a parapet. The other sappers widen and deepen the sap, throwing more earth on to the parapet. A sap is considered to advance in average ground about eight feet per hour. From the nearness of the enemy's works, running a sap is an extremely dangerous operation. When possible, therefore, it is carried on at night; in any case, the sappers are relieved at least every hour. When a sap is enlarged to the dimensions of a trench, it bears that name.

SA'PAJOU, a name sometimes applied to all that division of American monkeys which have a prehensile tail, and sometimes limited to those of them which are of a slender form, as the genera *Ateles* (q. v.), *Cebus* (q. v.), &c.

SAPINDA'CEÆ, a natural order of exogenous plants, consisting of trees and twining shrubs furnished with tendrils, and a few herbaceous climbers. Their leaves are often marked with lines or pellucid dots. The flowers are in racemes or racemose panicles, hermaphrodite or unisexual. The calyx is 4—5-partite, or consists of 4—5 sepals. The petals are 4—5, occasionally wanting, hypogynous, usually having an appendage in the inside. The stamens are usually 8—10; often inserted into the disc, which is fleshy, and sometimes glandular. The ovary is generally 3-celled, the cells containing one or few ovules. The fruit is fleshy, or *samaroid*, or capsular. The order contains about 380 known species, natives of warm climates, especially of South America and India; none of them natives of Europe, although the HORSE-CHESTNUT (q. v.) is now as well known in many parts of it as most of its native trees.—The timber of some species is valuable, particularly that of *Pteroxylon utile* and *Hippobroma alatum*, natives of the Cape of Good Hope, the former known there by the name of *Nieshout*, and the latter of *Pardepis*. Some are used in medicine as astringents. Narcotic and poisonous properties are very generally developed– also a saponaceous principle, especially in the genus *Sapindus* (see SOAP BERRY) Yet GUARANA BREAD (q. v.) is made from the seeds of a species of this order; the leaves of another (*Cardiospermum halicacabum*) are used as a boiled vegetable in the Moluccas; and the fruits of some species are excellent.

SAPODI'LLA PLUM, the name given in the West Indies to the fruit of *Achras Sapota* and other species of *Achras*, a genus of the natural order *Sapotaceæ*. The seeds are aperient and diuretic, but an overdose is dangerous. The pulp of the fruit is subacid and sweet, and it is much esteemed for the dessert in the West Indies. The fruit of *Achras mammosa* is called MARMALADE. The NASEBERRY, also of the West Indies, belongs to this genus.

SAPONIFICA'TION. See OILS AND FATS, and SOAP-MAKING.

SA'PONIN ($C_{24}H_{20}O_{14}$) is a vegetable principle contained in various plants, including the *Saponaria officinalis*, or Soap-wort, the *Polygala Senega*, several varieties of *Lychnis*, the fruit of the horse-chestnut, &c. It is readily extracted from the root of soap-wort by means of boiling alcohol, which, as it cools, deposits the saponin as an amorphous sediment. It derives its name from its behaviour with water, in which it is soluble in all proportions, yielding an opalescent fluid which froths when shaken, like a solution of soap, if even $\frac{1}{1000}$th part of saponin be present. Its solution, or an infusion of soap-wort, is sometimes employed in place of a solution of an alkaline soap, for cleansing the finer varieties of wool from grease.

SAPOTA'CEÆ, a natural order of exogenous plants, consisting of trees and shrubs, often abounding in milky juice. The leaves are leathery, entire, and without stipules. The flowers are axillary; the calyx regular, persistent, generally with five divisions; the corolla monopetalous, hypogynous, deciduous, regular, its segments usually equal in number to those of the calyx, rarely twice or thrice

as many. The stamens are inserted on the corolla, fertile ones generally as many as the segments of the calyx, and generally with alternate sterile ones. There is no disc. The ovary is superior, with several cells, each cell with one ovule. The fruit is fleshy; the seeds nut-like, sometimes cohering; the *testa* bony and shining, with a very long, opaque, and softer scar on the inner face.—There are considerably more than two hundred known species, chiefly natives of the tropics, and the remainder of subtropical countries. One of the most recently discovered species is also already one of the most important, *Isonandra gutta*, which produces GUTTA PERCHA (q. v.).—The fruits of some are pleasant, as the SAPODILLA (q. v.), and other species of the genus *Achras*, the STAR APPLE, and other species of *Chrysophyllum* (q. v.), different species of *Mimusops; Imbricaria Malabarica* and *I. maxima*, various species of *Lucuma*, &c. The genus BASSIA (q. v.) contains species valuable for the oils which they yield. The seeds of *Mimusops elengi* also yield oil abundantly.

SAPPAN WOOD, SAPAN WOOD, or BUKKUM WOOD, the wood of *Cæsalpinia Sappan* (see CÆSALPINIA), an East Indian tree, about forty feet high, with twice pinnate leaves, and racemes of yellow flowers. The wood is much used as a dye-wood, yielding a good red colour, which, however, is not easily fixed. It is a very considerable article of export from Singapore and other ports of that region both to Calcutta and to Europe.

SAPPER, the name given to a private soldier in the corps of Royal Engineers.—The name of the corps was formerly Royal Sappers and Miners.—The pay of a sapper is £22, 1*s.* a year, with extra pay when at work; the number of such men for 1865 is 3296. Only men of good character, already adepts in a mechanical trade, are eligible for this service, which is very popular, as an intelligent sapper frequently passes into some situation in civil life for which his practical military training specially fits him. Many sappers are excellent surveyors, photographers, and draughtsmen.

SA'PPHIRE, a gem excelled in value by no precious stone except diamond, and regarded as a variety of Corundum (q. v.), highly transparent and brilliant. It is sometimes colourless, and the colourless kind, called *White S.*, is sometimes sold as diamond. It more frequently exhibits exquisite colour, generally a bright red or a beautiful blue; more rarely, gray, white, or green. The red variety is the Oriental Ruby (q. v.) of lapidaries; the blue is that commonly called S., and which has received this name from ancient times. It is found crystallised, usually in six-sided prisms, terminated by six-sided pyramids; and is sometimes found imbedded in gneiss; but it more frequently occurs in alluvial soils. It occurs at Bilin in Bohemia, and Expailly in Auvergne, but more abundantly in some parts of the East. Ceylon is famous both for its rubies and its sapphires, the latter being the more abundant. They occur with garnets and other minerals, in a stratum of water-worn pebbles firmly imbedded in clay, in which there are occasional lumps of granite and gneiss. But nothing has yet been done to seek for them in their original situation in the mountain rocks. A piece of S., which was dug out of the alluvium within a few miles of Ratnapoora in 1853, was valued at upwards of £4000. The S. was one of the stones in the breastplate of the Jewish high-priest. Among the Greeks, it was sacred to Jupiter.—The name *Girasol S.* is given to a beautiful variety with a pinkish or bluish opalescence, and a peculiar play of light. The *Chatoyant S.* has more pearly reflections. The *Asteria S.* has in the midst of it a star of six bright rays, resulting from its crystalline structure.

SA'PPHO, along with Alcæus, the chief representative of the Æolian school of lyric poetry, was born either at Mitylene or at Eresos in Lesbos. She was only six years old when she lost her father Scamandronymus. She was contemporary with Alcæus, Stesichorus, and Pittacus, with the first of whom she lived in friendly intercourse, as is seen in the surviving lyrics of both. All that we know of her is contained in an obscure reference in the Parian Marble, and in one of the epistles of Ovid, to her having fled from Mitylene to some place of refuge in Sicily, between 604 and 592. Her famous plunge into the sea from the Leucadian rock, on finding her love for Phaon unrequited, seems to be an invention of later times. At Mitylene, she is supposed to have been the centre of a literary coterie, all of them females, and most of them pupils of her own in the art of poetry. Her moral character has been the subject of controversy in modern times; the most recent disputants being the late Colonel Mure and the well-known F. G. Welcker of Bonn, who, in the *Rheinisches Museum* (1857—1858), appeared, the former, for the prosecution, and the latter for the defence. To whatever opinion on this subject we may incline, there is no doubt of her high lyrical genius, which was the admiration of antiquity from Solon downwards, and which, as still surviving in her matchless ode to Aphrodite, enhances our regret that of the nine books of her poems, we only possess fragments. The best text is that contained in Bergk's *Poetæ Lyrici Græci* (1854); the best separate edition is Neue's (1827).

SAPUCAIA NUT, the seed of *Lecythis ollaria*, a lofty tree, which is plentiful in the forests of the north of Brazil, and belongs to the natural order *Lecythidaceæ*. The fruit is urn-shaped, as large as a child's head, and opens by a lid which falls off. Each fruit contains a number of seeds or nuts, as in the case of the allied Brazil nut. The flavour is finer than that of the Brazil nut, although, hitherto, the S. N. is much less common in our shops. Its form is oval, somewhat pointed at both ends, which are slightly bent in opposite directions. Monkeys are very fond of the S. N., and are sometimes caught in consequence of thrusting the hand into a capsule, and not being able to withdraw it when filled with a nut, whilst they obstinately keep hold of the expected prize.

SA'RABANDE, originally a slow dance, said to be of Saracenic origin; and hence a short piece of music, of deliberate character, and with a peculiar rhythm, in $\frac{3}{4}$ time, the accent being placed on the second crotchet of each measure. The sarabande is of frequent occurrence among the *suites* or series of short pieces written by Handel, Sebastian Bach, and others of the old masters, for the harpsichord or clavichord.

SARACE'NIC ARCHITECTURE. See ARABIAN ARCHITECTURE.

SA'RACENS, a name variously employed by medieval writers to designate the Mohammedans of Syria and Palestine, the Arabs generally, or the Arab-Berber races of Northern Africa, who conquered Spain and Sicily, and invaded France. At a later date, it was employed as a synonym for all infidel nations against which crusades were preached, and was thus applied to the Seljuks of Iconium, the Turks, and even to the pagan Prussians. The true derivation of the word was long a puzzle to philologers; Du Cange deduced it from Sarah, the wife of Abraham, an opinion coincided in by the medieval Christian authors; Hottinger (*Biblio. Orient.*), from

the Arab. *saraca*, to steal; Forster (*Journey*), from *sahra*, a desert; while others strove to see its origin in the Hebrew *sarak*, poor; but the opinion which has been most generally supported, and prevails at the present time, is, that the word was originally *Sharkeyn* * (Arab. 'eastern people'), corrupted by the Greeks into *Sarakenoi*, from which the Romans derived their word *Saraceni*. The epithet Sarakenoi was applied by the Greek writers (from the 1st c. of the Christian era) to some tribes of Bedouin Arabs in Eastern Arabia, though they do not agree among themselves as to the particular tribe so denominated. Pliny and Ammianus place the S. in Arabia Petræa and Mesopotamia, on the common frontier of the Roman and Persian empires; and the description of them by the latter, a most painstaking and accurate historian, coincides, in every important particular, with what is known at the present day of the Bedouin tribes of those regions.

SARACEN'S HEAD, a not unfrequent bearing in Heraldry. It is represented as the head of an old man, with a savage countenance.

SARAGO'SSA. See SUPPLEMENT.

SARASWATÎ is, in Hindu Mythology, the name of the wife, or the female energy, of the god Brahman, the first of the Hindu Trimûrti or triad. She is also the goddess of speech and eloquence, the patroness of music and the arts, and the inventress of the Sanscrit language and the Devanâgarî letters. She was induced to bestow these benefits on the human race by the sage *Bharata*, who, through his penance, caused her to descend from heaven, and to divulge her inventions. Hence she is also called *Bhârati*. She was very white, hence another of her names, *Mahâs'wetâ*, or *Mahâs'uklâ* (from *mahat*, great, and *s'weta* or *s'ukla*, white).—S. is also the classical name of the river now called *Sursootu*, which rises in the mountains bounding the north east part of Delhi, whence it runs in a south westerly direction, and is lost in the sands of the great desert in the country of the Bhatti. According to the Hindus, the river only disappears in this place, and continuing its course underground, joins the Ganges and Jumna at Allahabad.

SARATO'GA SPRINGS, one of the chief watering-places in the U.S., is in New York, 38 miles north of Albany. It contains 23 mineral springs, some chalybeate; some containing iodine, with salts of soda and magnesia; and all highly charged with carbonic acid. They are prescribed in diseases of the liver, chronic dyspepsia, &c. In the village are 22 hotels, some of immense magnitude; and during each season, there are from 25,000 to 35,000 visitors. Pop. in 1860, 6521.

SARATO'V, a government in the south east of Russia, is bounded on the E. by the river Volga, and on the N. by the governments of Penza and Simbirsk. Area, 31,213 sq. m.; pop. 1,636,135. Its dimensions were much larger prior to the year 1850, when a considerable portion of it—the portion to the *east* of the Volga—was taken to form a part of the government of Samara (q. v.), erected in that year. One-third of the area is pasture-land, $\frac{1}{7}$th is under crop, $\frac{1}{12}$th in wood, and $\frac{1}{17}$ths waste land. The chief rivers are the Volga and the Medwieditza. A number of German colonists settled here in 1765—1775, and distinguished themselves by their persevering industry and by diligent cultivation of the soil. Their descendants have become an important section of the population. Cattle-breeding is carried on extensively; fishing is of considerable importance.

SARATOV, a city of Russia, capital of the government of the same name, on the right bank of the Volga, 460 miles south-east of Moscow. Though its houses are generally built of timber, the town has a rich and picturesque appearance. Its 16 churches are ornamented with numerous towers and cupolas; and its broad streets, from the character of the houses and of the elegant equipages that roll through them, have quite a European appearance. It manufactures pottery, bricks, tobacco, silk, hosiery, &c. Pop. 63,838.

SARA'WAK, a kingdom on the north-west coast of Borneo, is bounded S. and W. by Sambas, E. by Brunai, and N. by the Bight of Datu. The coast stretches from the west of Cape Datu, in lat. 2 N., and long. 109° 55′ E., to the east of the river Samerahan, in long. 111° 3′ E., a distance of nearly 70 miles. Area, 3000 sq. m. Pop. 50,000. The Sarawak is the most important river; it has two navigable mouths, the one entering the Bight of Datu in lat. 1° 42′ 30″ N., and long. 110° 20′ 30″ E.; the other, a few miles further to the east. Other considerable rivers are the Rejang (navigable for 120 miles for vessels of more than 1000 tons), the Lûndu, Samerahan, and Sadang. A chain of mountains, 3000 feet in height, rises in S., and, with increasing elevation, tends towards the north; while others are detached, as the Samerahans, and the steep, densely-wooded Lundu. Sandstone and granite are the prevailing rocks; porphyries, basalt, and quartzose schists also occurring. In some parts, the soil is clayey; in others, it is a rich mould. With the exception of some cultivated spots, the surface is covered with forests, which abound with wild swine, harts, and a variety of monkeys. There is excellent coal near the river Sadang. Antimony ore, which can be both easily worked and shipped, is obtainable in any quantity; copper and gold have been found, and iron ore is plentiful at Lûndu. Fine timber trees, as ironwood, ebony, sandal-wood, teak, and other sorts peculiarly adapted for shipbuilding, grow on the lands near the mouths of the rivers. Overtopping them all is the tall Camphor Tree (*Dryobalanops aromatica*), from which, by incision, the valuable camphor-oil is obtained; or by felling and splitting the wood, the crystallised camphor, which is prized above that produced in any other part of Asia.

The climate is not considered unhealthy. Much rain falls from September to March, and the thermometer usually indicates about 83° F. Edible nests, wax, and aromatic woods are collected by the Dyaks for the Singapore market, and the plains are well adapted for the growth of rice and sago. In 1862, two cargoes of choice timber for shipbuilding were sent to the royal dockyards of Great Britain, and more attention is now being paid to that natural source of wealth. In 1863, the exports, the chief articles of which were gutta percha, sago flour, antimony ore, and edible birds' nests, amounted to £96,609; and the imports, chiefly gray and coloured shirtings, tobacco, brass-ware, opium, rice, and cocoa-nut oil, amounted to £103,689. The exportation of antimony and sale of opium are monopolised by the government, and with a small head-tax, form the chief revenue.

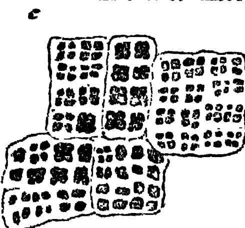
The original inhabitants are Dyaks, divided into some 20 tribes, and speaking different dialects; they are, for savages, mild, industrious, and honest. Malays live on the coast, and the mines are worked by Chinese. Since 1841, S. has been governed by

* *Sharkeyn*, or *Sharakyoun*, 'eastern people,' is thus opposed to *Magharibê*, or *Maghribê*, 'western people,' the self-styled appellation of the inhabitants of *Maghrib* ('the west') or *Morocco*.

Sir James Brooke (q. v.), as an independent rajah appointed by the sultan of Borneo, in return for distinguished services in putting down rebellion and restoring order; and even on the testimony of the Dutch, who view with extreme jealousy the increased influence of the British on that coast, his rule has done much to promote the civilisation and prosperity of his people.

The seat of government is the town of Sarawak, formerly called Kûtjing, near the mouth of the river, which is navigable for large ships. Mission-stations and schools have been erected, and the population has increased to 25,000. Trade, which has multiplied tenfold since Sir J. Brooke was appointed rajah, is principally carried on with Singapore.

SA'RCINA (Lat. a package), or SARCI'NULA, a genus of minute plants of very low organisation, sometimes reckoned among *Algæ*, and sometimes among *Fungi*. A number of forms or species are known. The first discovered, called *S. ventriculi*, was originally observed by Goodsir in matters vomited from the human stomach. It is of a roundish quadrangular form, about $\frac{1}{1000}$th to $\frac{1}{120}$th of a line in diameter; the individuals generally grouped in cubes of four, sixteen, or sixty-four in the cube, separated by rectangular striæ. Although the most common seat of sarcinæ is the human stomach, they have likewise been detected in the stomach of the tortoise, the rabbit, the dog, the ape, and in the cæcum of the fowl; in the urine, in a considerable number of cases; in the lungs; in the fæces and intestinal canal; in the fluid of the ventricles of the brain; in cholera stools; in the fluid of hydrocele; in the bones; and Dr Lowe has noticed its existence in stagnant water. It appears from the measurements of Welcher that the sarcinæ occurring in urine are about half the size of those occurring in the stomach, and the aggregations of sarcina cells are also smaller.



Sarcina Ventriculi, magnified 1000 diameters.

(Copied from the *Micrographic Dictionary*. Lond., Van Voorst.)

The occurrence of the sarcina in the urine, the fluid of the ventricles of the brain, &c., is probably a *post-mortem* phenomenon of little diagnostic or pathological importance. Its appearance in vomited fluids is, however, characteristic of a peculiar and important form of dyspepsia. The vomited matter in these cases has a faint acid smell, like that of fermenting wort, and is obviously in a state of fermentation. After standing a few hours, it becomes covered with a thick, brownish, yeast-like froth, and deposits a brown flaky sediment. On examining the froth and the deposit under the microscope, sarcinæ are found in great abundance, together with the torulæ characteristic of Yeast (q. v.). The fluid is always acid, if sarcinæ are present. The amount of vomited matter is always large, and sometimes enormous. It is usually ejected in the morning, after a night spent awake from a sense of heat, gurgling, and distention in the epigastric region; and its discharge gives almost immediate relief. Dr Budd, one of the highest authorities in diseases of the stomach, believes that the disease consists, primarily and essentially, in some organic change, which prevents that organ from completely emptying itself, and which causes a secretion from its coats, capable, when mixed with food, of undergoing or exciting a process of fermentation; and that the development of the sarcinæ bears to this process, or to some stage of it, the same relation which the development of torulæ bears to simple alcoholic fermentation. The well-known power of sulphurous acid in checking the fermentative process, induced Professor Jenner to try the effect of sulphite of soda—a salt which readily yields its sulphurous acid—in this disease; and experience has fully confirmed the accuracy of Jenner's induction; for this salt, administered soon after a meal, or when the fermenting process is commencing, in doses varying from 10 grains to a drachm, dissolved in water, is the most effectual remedy at present known for relieving this disorder. The hyposulphite of soda, in somewhat larger doses, has a similar action.

SA'RCINE (Gr. *sarx*, gen. *sarcos*, flesh) is the name now given to a nitrogenous substance ($C_{10}H_4N_4O_2$) which has been obtained from the muscular tissue of the horse, ox, and hare; and from various glandular organs, as the liver and the spleen of the ox, the thymus gland of the calf, and the human liver, in cases of acute atrophy of that organ, in which case it is associated with xanthine ($C_{10}H_4N_4O_4$), a substance differing from it only by two atoms of oxygen. It is identical with the substance formerly known as Hypoxanthine.

SARCOLE'MMA is the term applied to the delicate sheath which invests each primary muscular fibre. See MUSCLE.

SARCO'MA is a somewhat vague term used by Abernethy and many subsequent surgical writers to designate a fleshy or firm morbid tumour. The term sarcoma is comparatively rarely met with in recent works on surgery.

SARCO'PHAGI. See CANNIBALISM.

SARCO'PHAGUS (Gr. flesh-eater), any stone receptacle for a dead body. The name originated in the property assigned to a species of stone, found at Assos in Troas and used in early times, of consuming the whole body, with the exception of the teeth, within the space of forty days. The oldest known sarcophagi are those of Egypt, some of which are contemporary with the pyramids. The earliest of these are of a square or oblong form, and either plain, or ornamented with lotus leaves; the later are of the form of swathed mummies, and bear inscriptions. The Phœnician and Persian kings were also buried in sarcophagi. The Roman sarcophagi of the earlier republican period were plain. Sarcophagi were occasionally used in the later republic, although burning had become the more general mode of disposing of the dead. The use of stone chests for the interment of distinguished persons has not been altogether discontinued in modern times.

SARDANAPA'LUS. See ASSYRIA.

SARDE, or SARDA, a variety of quartz, differing from carnelian only in its very deep red colour, blood-red by transmitted light. It is rare, and brings a much higher price than common carnelian. The name is probably from Sardis. The S. was one of the stones of the breastplate of the Jewish high-priest. There were also two in the ephod. The SARDONYX is an Onyx (q. v.) containing layers of sarde.

SARDÉS, or SARDIS, anciently a city of Asia Minor, the capital of Lydia, was situated in a fertile plain between the northern base of Mount Tmolus and the river Hermus, about 60 miles east-north-east of Smyrna. Through its *agora*, or market-place, flowed the Pactolus, a tributary of the Hermus. The city is first mentioned by Æschylus. It was taken by the Cimmerians, in the reign of

King Ardys (680—631 B.C.). In the reign of Crœsus, the last Lydian king, S. attained its highest prosperity. It became the residence of the Persian satraps after the overthrow of the Lydian monarchy. The Athenians burned it 503 B.C., and it afterwards passed under the Romans, and was the seat of a separate provincial government. It is one of the Seven Churches mentioned in the Book of Revelation.—*Sart*, the modern Sardis, is a poor village, worthy of mention only for the ruins of the ancient city to be seen in the vicinity. Of these, the chief are those of a stadium, of a theatre, and of the Acropolis.

SA'RDINE (*Clupea Sardina*), a fish of the same genus with the herring and pilchard, smaller than the pilchard; abundant in the Mediterranean, and found also in the Atlantic Ocean, although not so far north as the British shores. It is much esteemed for its flavour, and sardines preserved in oil are exported in large quantities from some of the Mediterranean ports. But the 'sardines' of the west coast of France, which are largely imported into Britain, are generally not true sardines, but young sprats—the *garvies* of the Firth of Forth—and sometimes young herring.

Sardines appear in shoals on the coasts of the Mediterranean at particular seasons, as herrings and pilchards on those of Britain. The S. fishery on the coast of Provence is chiefly in the months of May, June, and July; but the fishery for sprats, which are cured as sardines, and sold under that name on the coast of Bretagne and elsewhere in the west of France, takes place in the winter months. The quantity of both kinds cured is so great as to amount in value to 3,000,000 or 4,000,000 francs annually, about £120,000 to £160,000 sterling. They are exported to the most distant parts of the world; cured with oil in tin boxes, forming a much esteemed delicacy, and, at the same time, a most wholesome article of food. To cure them in this way, they are first carefully washed in the sea, then sprinkled with fine salt; and after a few hours, the head, gills, &c. are removed; they are then washed again, and spread out on willow branches or wire-work, exposed to the sun and wind, if the weather is dry, but in damp and rainy weather, to a current of air under cover. They are next put into boiling oil, in which they remain for a short time, and when they are taken out, the oil is drained away from them as much as possible, and they are put into the tin boxes, of which the shape and appearance are so familiar to everyone. The boxes being filled with sardines, are filled up with oil, the lid is soldered on, and they are placed for a short time in boiling-water, or exposed to hot steam. The boxes which have leaked or have burst in boiling are rejected, and those which remain sound are now ready for the market.

In the south of France, sardines are sometimes cured in red wine, and those so cured are called *Sardines Anchoisées*, or Anchovied Sardines.

There seems to be no good reason why the sprats of the British coast should not be cured in oil, like those of the west coast of France, and so prove a new source of wealth, besides probably being brought at a lower price to the market, to the advantage of those for whom sardines are at present too expensive.

Several species of small *Clupeidæ*, much resembling the S., are found in different parts of the world, and are used in the same way as the S. of the Mediterranean. One species frequents the southern and eastern coast of Ceylon in such vast shoals, that 400,000 have been taken at a single haul of the nets in a little bay; and when the shoal approached the shore, the broken water became as smooth as if a sheet of ice had been floating below the surface.

SARDI'NIA, KINGDOM OF, a former kingdom of Italy, and the nucleus of the present *Kingdom of Italy*, included the duchies of Savoy and Genoa, and parts of those of Montferrat and Milan, the principality of Piedmont, the county of Nice, and the islands of Sardinia and Caprera, amounting in all to 19,564 English sq. m. of continental territory, with a pop. of (1857) 4,590,250, and 9205 of insular territory, with a pop. of 577,282; total area 28,769 English sq. m., pop. 5,167,542. In 1859, it was increased by the addition of the Austrian portion of the Milanese, and diminished by the cession in 1860 of Savoy and Nice to France, the change in the continental territory being shewn by the following figures: area, 21,099 English sq. m.; pop. (1858) 6,530,232; the insular territory remaining unaltered. The various districts above mentioned differ greatly from each other in physical configuration and climate, and the more important of these are treated in separate articles. See also ITALY. The Roman Catholic religion was established by law in March 1848; but monastic orders, with the exception of those which are also benevolent institutions, were suppressed May 28, 1855. In 1859, the army amounted to 76,172 men, and the fleet to 29 ships (none of them men-of-war), with 436 guns; the revenue (1858), which was mostly derived from customs, duties, and direct taxation, to £5,799,301; and the expenditure to £5,949,902—a want of equilibrium in the finances which had long existed, and which caused the establishment, since 1819, of a gradually increasing national debt, that amounted (1858) to £27,080,810. The annual import trade amounted (1857) to a declared value of £19,123,054, and the exports to £14,605,043.

The kingdom of S. was originated by a treaty (24th August 1720) between Austria and the Duke of Savoy (q. v.), by which the latter agreed to surrender Sicily to the former on condition of receiving in exchange the island of Sardinia, and the erection of his states into a kingdom. In 1730, *Victor-Amadeus I.*, the last Duke of Savoy and first king of S., resigned the throne to his son, *Charles-Emmanuel I.* (1730—1773); but repenting his resolution, and attempting to resume the government, he was put in prison, where he died in 1732. His son, by joining with France and Spain against Austria, obtained (1735) the territories of Tortona and Novara, to which were further added (1743), during the war of the Austrian Succession, the county of Anghiera, and the territories of Vigevano and Pavia. He was the author of the code known as the *Corpus Carolinum*. His successor, *Victor-Amadeus II.* (1773—1796), acceded to the European coalition against France, and was deprived in consequence of Savoy and Nice in 1792; but sustained by England and the pope, he raised an army, and maintained himself in his kingdom till 1796, when Bonaparte forced him formally to relinquish the territories he had lost. His son, *Charles-Emmanuel II.* (1796—1802), was at first an ally of France; but the Directory, in 1798, compelled him to surrender all his continental possessions, which were then incorporated with France; and it was not till the first peace of Paris (May 30, 1814) that the House of Savoy regained its territories. The Congress of Vienna (December 1814) annexed to S. the ancient republic of Genoa, and the second peace of Paris (1815) restored a small portion of Savoy, which France still possessed, and gave the king a protectorate over the small principality of Monaco. Long before this time, Charles-Emmanuel had abdicated, and his brother, *Victor-Emmanuel I.* (1802—1821), succeeded to his rights, and made his entry into

Turin, 20th May 1814. His return restored the ancient misgovernment; and similar political changes in the other Italian states revived the societies of the 'Carbonari' (q. v.) and other similar secret associations, whose aims were supported by a portion of the nobility and army, and by the heir-presumptive to the throne, Charles-Albert, Prince of Savoy-Carignan. The insurrection of the army on the 9th and 10th of March 1821, brought on a general revolution. But the king having abdicated in favour of his brother, *Charles-Felix* (1821—1831), and the Austrians having come to the rescue, the insurrection was put down. Under the protection of an Austrian army of occupation till 1823, Charles-Felix re-established absolute power, recalled the Jesuits, persecuted the Protestants, and took various other measures for rooting out all opposition. On his death, the elder line of Savoy became extinct, and the succession fell to the cadet branch of Savoy-Carignan (see SAVOY, HOUSE OF), whose rights had been recognised by the Congress of Vienna, and *Charles-Albert* (q. v.) (1831—1849) ascended the throne. The liberals were gratified with some slight reforms, but the power of the clergy was untouched, and the conspiracy of 30th November 1833 at Turin, and the mad inroad of Mazzini, at the head of a small band of German, Polish, and Italian refugees, in February 1834, only disturbed the country, and confirmed the government in its despotic policy. The interior administration was, however, carried on with more energy than under the two previous reigns, through the conclusion of treaties with France, Britain, Turkey, the Low Countries, Denmark, Austria, and the Hanse Towns, &c.; the construction of roads, bridges, and railways was vigorously prosecuted, and agriculture and other industries were encouraged. In 1842, the king commenced a gradual but progressive liberal policy, promulgated a limited act of amnesty to political offenders, relaxed the severity of censorship, reformed judicial administration and prison discipline, and abolished the feudal system in Sardinia. The kingdom participated in the agitations of 1846 and 1847, which affected the whole peninsula, but was wholly exempt from insurrections and conspiracies, the people contenting themselves with expressing their views and wishes in petitions and demonstrations displaying entire confidence in the government. On February 8, 1848, the king announced a new and extremely liberal constitution, which was proclaimed some weeks afterwards; a liberal law of election was decreed, the first Sardinian parliament convoked for the 17th April, and the act of amnesty declared general. In the midst of these changes, the revolution broke out, and Charles-Albert, who was saluted with the title of 'the sword of Italy,' put himself at the head of the movement, and declared war against Austria. (See ITALY, RADETSKY, &c.) On the day after the fatal rout of Novara (13th March 1849), Charles-Albert resigned the throne to his son, *Victor-Emmanuel II.* (q. v.), who has succeeded in accomplishing the union of Italy into one kingdom, with the exception of Venetian Lombardy, which is still Austrian, the remnant of his dominions which has been preserved to the pope by the French, and the duchy of Savoy and county of Nice, which the king was forced to cede to France.

SARDI'NIA, ISLAND OF, the largest, after Sicily, of the islands of the Mediterranean, lies directly south of Corsica, from which it is separated by the Strait of Bonifacio, a channel only 7 miles wide in its narrowest part. S. is situated about halfway between Central Italy and Africa, and between Southern Italy and Spain. Its length is 166 miles; greatest breadth 90 miles; and area 9205 sq. miles. The country is mostly mountainous, some of the peaks of the central chain having an elevation of 6300 feet. The Limbara range, in the north-west, is granite, the diagonal chain palæozoic, and the central range of the tertiary calcareous formation; many of the peaks, especially within the semicircle formed by the Limbara range, are extinct volcanoes. The coasts are generally steep and rugged. A few islands lie off the coast, and all, of any considerable size and importance, are situated at the corners; off the north-east corner are the Maddalena group, consisting of Maddalena, Caprera, and five or six minute islets; off the north-west corner is Asinara; and off the south-west corner are San Pietro and San Antioco. The island is well supplied with streams, but none of them have a long course, and only one is partially navigable.

Soil and Climate.—Between the mountain ranges are several wide valleys of remarkable beauty and fertility. There are also several large sandy or stony districts (*macchie*), of almost irremediable sterility. The mountain sides are partly rocky and barren, partly clad with woods, and partly fitted for pasture. The climate is mild, the temperature ranging from 34° to 90°; but in the low lands, which are largely of a marshy character, and in the neighbourhood of the littoral lakes, a deadly malaria (*intemperie*) prevails, especially in autumn. The inhabitants of those districts, who can afford to do so, migrate annually during the unhealthy season; and those who are compelled to remain never leave their houses till an hour after sunrise, and carefully return before sunset, taking all precautions to prevent the entrance of the poisonous gas by door or window. The inhaling of the miasma by a stranger is considered among the inhabitants to be as deadly as a dose of strong poison.

Products.—Wheat, barley, maize, oranges, and other fruits are produced in abundance, and are esteemed for their excellent quality. The vine is extensively cultivated, but, from carelessness in the process, the wine is not so good as might naturally be expected. The olive grounds are extensive, and the produce excellent. Tobacco (of inferior quality), cotton, linseed, flax, hemp, saffron, and madder are also produced. The woods which clothe the mountain sides are chiefly composed of cork, chestnut, oak, pine, and other timber trees, which form a considerable item in the export trade. Many mountain-slopes have, however, been much deteriorated in fertility by the excessive cutting down of timber.

The bullock is the favourite animal for draught, but horses are also used; and a small species of pony, which in ancient times was much esteemed by the Roman matrons, is still found. The sheep are of ordinary quality, and the swine are said to be among the best in Europe. Few cows are kept, and cheese is obtained almost wholly from sheep's and goat's milk. Wild boars and deer are not uncommon, and the Moufflon (q. v.) is found in the Alpine woods. Foxes, rabbits, hares, and martens are so abundant that a large export trade in their skins is carried on. The fisheries are important.

Manufactures are insignificant, being mostly the result of home industry; but the royal manufactories of gunpowder, salt, and tobacco are of considerable importance. S. is rich in minerals, but these, like its other resources, are as yet little developed; silver, mercury, granite, gypsum, marble, alabaster, amethyst, and other precious stones, are found; and lead, iron, and copper are in considerable abundance. Gold, bismuth, and antimony are said to exist.

Inhabitants.—The inhabitants bear a considerable resemblance to the Greeks, and speak a barbarous dialect, composed chiefly of Spanish, Arabic, and Italian; they are ignorant and bigoted, having

been subjected to misgovernment and oppression from their emancipation from Roman rule till 1836, when feudal tenure was abolished, and the enormous power of the clergy somewhat reduced. They are generally stupid and indolent, clothe themselves in sheep-skins, and invariably profess the Catholic religion. The custom of the *Vendetta* is frequently practised, though not to the same extent as in Corsica.

History.—S., at first called by the Greeks *Ichnusa* and *Sandaliotis* (from its resemblance to a human foot-print), and afterwards *Sardo* by the Romans, was colonised at a very early period. The first really historical event is its conquest, about 480 B. C., by the Carthaginians, who, during their occupation, rendered the island a celebrated corn-producing country. They were forced to abandon it to the Romans (238 B.C.), who gradually subdued the rebellious natives, and made it a province of the republic; but on three several occasions, formidable outbreaks required the presence of a consul with a large army to restore the authority of Rome. From this time it was held as a subject province, and on account of its value as the 'granary of Rome,' was carefully protected from invasion. It fell into the hands of the Vandals and other barbarians, and was recovered by the Eastern Empire in 534 A. D., but was finally separated from the Roman Empire by the Saracens. They were driven out in their turn by the Pisans, one of whose deputy-governors, being supported by the Genoese, obtained the erection of S. into a kingdom (1154) by Frederick I. The popes, who had long claimed a right of suzerainty over the island, gave it, in 1296, to James II. of Aragon; and it continued in the possession of Spain till 1708, when it was taken possession of by the British, and by the peace of Utrecht (1713) it was yielded to Austria. In 1730, Austria gave it to the Duke of Savoy in exchange for Sicily, and it has since that time formed a part of the dominions of the House of Savoy. When S. came to the House of Savoy, two-thirds of it belonged to barons of Spanish descent, and the most of the remainder to the clergy, who also levied a tithe on the whole produce, and for a century afterwards, it was shamefully neglected by the government. However, in 1836 and 1837, patrimonial rights and compulsory labour were abolished; and in 1838 and 1847, the peasants were freed from the rest of the vexatious imposts with which they were burdened. In 1847, the vice-royalty was abolished, and S. incorporated with the Sardinian kingdom (q. v.). It is at present divided into two provinces or *capos*—Cagliari in the south, containing 5166 English sq. m., with a population of 372,097; and Sassari in the north, containing 4093 English sq. m., with a pop. of 215,967. Cagliari is the capital.

SARDO'NIC SMILE is a term applied by the older medical writers to a convulsive affection of the muscles of the face, somewhat resembling laughter. It may occur in tetanus or lock-jaw, and other convulsive affections, or may result from the action of certain vegetable poisons, such as the *Ranunculus sceleratus*, or Celery-leaved Crowfoot. The name is derived from a species of ranunculus that grows in Sardinia, termed *Herba Sardonica* or *Sardoa*.

SARGA'SSUM. See GULF-WEED.

SARI', the capital of the province of Mazanderan, Persia, is situated on the banks of a small stream, the Tejend, 18 miles south of the Caspian Sea. It is surrounded by a dilapidated wall and ditch. S. is distinguished by its remarkable tower, and by its gardens, which are adorned with rows of beautiful cypresses, forming, when seen from a distance, a conspicuous feature of the landscape. S. is a modern town, built near the ruins of a very ancient town of the same name, and at present contains a pop. of about 35,000, who carry on a small trade in the produce of the province with Russia, through the Caspian ports, and with the interior of Persia. The great causeway of Shah Abbas runs through the town.

SARK, one of the Channel Islands. See JERSEY—THE CHANNEL ISLANDS.

SARMA'TIANS. The root *s-rm* in this word is in all probability the same as *s-rb*, so that it has been conjectured the name S. has the same ethnological meaning as *Serbi* and *Servi*. The oldest Greek form of the word (and the only one found in Herodotus) is *Sauromatæ*. The region occupied by the S. embraced (according to Ptolemy, our chief authority) a portion both of Europe and Asia.—1. The *European S.* are found as far west as the Vistula; as far north as the Venedicus Sinus (Gulf of Riga?), or even further; as far east as the Crimea and the Don; and as far south as Dacia. Roughly speaking, their territory corresponded to modern Esthonia, Lithuania, Western Russia, and parts of Poland and Galicia. The principal, or at least the best known nations among the European S., were the Peucini and Bastarnæ, about the mouths of the Danube, and in Moldavia and Bessarabia; the Jazyges and Roxolani, probably in Kherson, Tauris, and Ekaterinoslav; the Venedi and Gythones, about Riga, Memel, and Elbing; and the Avareni, at the sources of the Vistula.—2. *The Asiatic S.* are found as far west as the Tanais (Don), as far east as the Caspian, as far south as the Euxine and Caucasus, and as far north as the water-shed between the rivers that fall into the White Sea and the Black, but we have no distinct knowledge of their territorial possessions. North of the Don, in the region now occupied by the Don Cossacks, dwelt the *Periérbidi;* south-east of it, about Astrakhan, the Jaxamatæ. Beyond the Perierbidi lay the Asæi, the 'horse-eating' (*Hippophagi*) Sarmatæ, the 'Royal' and Hyperborean Sarmatæ, and many others, besides a multitude of nations in the region of the Northern Caucasus. The question naturally arises: What were these Sarmatians? The vast extent of territory over which they spread, and the manifest inclusion under the name S. of different races, as, for example, Goths, Finns, Lithuanians, Circassians, Scythians, and Slaves, prove that the term was loosely used by Ptolemy and his contemporaries, just like the older Herodotean term Scythia, and is not strictly ethnological; yet Dr Latham's view (see Smith's *Dictionary of Greek and Roman Geography*, arts. Sarmatia and Scythia), that it designated on the whole Slavic races, and in particular the north-eastern portion of the great Slavic family, may be regarded as tolerably certain. The S. figure prominently among the barbarians who vexed the north-eastern frontiers of the Roman Empire.

SA'RNO, a city of Southern Italy, in the province of Principato Citra, on the river of the same name, 13 miles north-west of Salerno. It is a well-built town, with a very handsome cathedral containing some good paintings, and has a seminary for priests, a hospital, several paper-manufactories, and foundries. Its environs are famous for the produce of very fine silk. In the centre of the town, there are springs of sulphureous and chalybeate waters. Among the buildings worthy of notice is the ancient castle of the Barberini family. Pop. 15,341.

In the plain near S., Teias, king of the Goths, in a desperate battle with the Greeks, commanded by Narses, in 553, was vanquished and slain, and the reign of the Goths in Italy brought to a close.

SARPI, PIETRO, better known by his monastic appellation, FRA PAOLO, or Brother Paul, was born at Venice, in the year 1552; became an early proficient in mathematics, as well as in general literature, resolved to embrace the monastic life, and in his 20th year took the vows in the religious order of the SERVITES (q. v.). Soon afterwards, he was appointed by the Duke of Mantua to a professorship of theology in that city; but he held it only for a short time; and returning to his order, of which he was elected provincial in his 27th year, he continued to pursue in private his studies in languages, in mathematics, in astronomy, and in all the other branches of natural philosophy, including the medical and physiological sciences, in which he attained to great proficiency, being by some writers regarded (although, as it would seem, without sufficient grounds) as entitled to at least a share in the glory of the discovery of the circulation of the blood. The freedom of some of his opinions led to his being charged at Rome with heterodox views, and although held free from actual heresy, his opinions became an object of suspicion; and in the dispute between the republic of Venice and Paul V. (q. v.) on the subject of clerical immunities, S. justified these suspicions by the energy with which he threw himself into the anti-papal party. On being summoned to Rome to account for his conduct, he refused to obey, and was accordingly excommunicated as being contumacious. The zeal of S.'s opposition to Rome drew upon him the hostility of the partisans of the Roman claim; and an attempt was even made upon his life by a band of assassins, whom the ardour of party-spirit at the time did not hesitate, although, upon mere presumption, to represent as emissaries of the Jesuits. Fra Paolo himself openly professed to share this suspicion, and believing his life in danger, confined himself thenceforward within the enclosure of his monastery. It was in this retirement that he composed his celebrated *History of the Council of Trent*, which has long been the subject of controversy and criticism. It was published in London by Antonio de Dominis, the ex-bishop of Spalatro, who had recently conformed to Protestantism, at first under the pseudonym of *Pietro Soave Polano*, an anagram of the real name of the author, *Paolo Sarpi Veneto;* and it almost immediately rose into popularity with the adversaries of Rome as well in England as throughout the continent. It is by no means a simple history of the proceedings of the Council, but rather a controversial narrative of the discussions, in which the writer freely enters into the merits of the doctrines under discussion, and in many cases displays a strong anti-Catholic bias. His judgment of the motives and of the conduct of the members of the Council, especially of the representatives of the pope and his partisans in the assembly, is uniformly hostile, and has been accepted by Protestants as a strong testimony against Rome from a member of the Roman Church. It must be confessed, however, that whatever judgment we may form of S.'s credibility on his own merits, it is idle to look upon him in the light of a member of the church of Rome. It is plain, from numberless declarations in his work, and from remains of his correspondence published after his death, that his opinions were strongly biassed, not merely with an anti-Roman, but even with rationalistic leanings; and Ranke does not hesitate to declare that his unsupported statements cannot be accepted with security, when there is question of a damaging narrative of some intrigue of the legates in the Council, or some cabal of the Italian bishops in the interest of Roman views. A voluminous counter-history of the Council of Trent was written by the Roman Jesuit (afterwards Cardinal) Pallavicino, which follows him into the details as well of the history as of the controversy. It would be out of place here to enter into any comparison of these rival histories of the Council. The History of S. has been translated into most of the European languages. The French translation is by the celebrated Courrayer, and is enriched with copious vindicatory and critical annotations. S. lived in the full vigour of intellect to the age of 71, and died of a neglected cold, which led to a protracted illness, in the year 1623. His life, as an ecclesiastic, was without reproach; and his long-tried zeal in the cause of the republic had made him the idol of his fellow-citizens. He was honoured accordingly by the republic with a public funeral. His *History of the Council of Trent* has been reprinted in numberless editions; and his collected works were published at Verona in 8 vols. 4to, 1761—1768, and again at Naples, in 24 vols. 8vo, in 1790.

SARRACENIA, or **SIDE-SADDLE FLOWER**, a genus of very singular marsh plants, natives of North America. *S. purpurea* is common from Hudson's Bay to Carolina; the other species are confined to the Southern States. They are herbaceous perennial plants, with radical leaves and scapes, which bear one or more large flowers. The



Sarracenia Purpurea:
1, a flower, from which the corolla has fallen off, shewing the very large 5-angled stigma; *a*, a fully expanded flower; *b*, germen; *c*, section of the fruit.

leaves are of very remarkable structure, the stalk being hollow and urn-shaped, and the blade of the leaf articulated at its apex, and fitting like a lid. It is from the form of the leaves that the name Side-saddle Flower is derived.—The genus is the type of the small natural order *Sarraceniaceæ*, the only other genus of which has recently been discovered in Guyana. The order is regarded as closely allied to *Papaveraceæ*.

SARREGUEMINES, a small frontier town in the north of France, in the dep. of Moselle, 41 miles east of Metz. It is famous for its manufactures of pottery; hempen fabrics and velvets are also made. Pop. (1862) 5169.

SARSAPARI'LLA, or **SARSA**. This much employed medicine is the produce of several species of *Smilax* (q. v.), although the species yielding the different kinds brought to the market have not yet been fully ascertained. Among them, the three principal are believed to be *S. officinalis, S. medica*, and *S. papyracea;* twining shrubs, with prickly angular stems; the first with large ovate-oblong, acute, heart-shaped, leathery leaves; the second

with shortly acuminate smooth leaves; the lower ones heart-shaped, the upper ones approaching to ovate; the third with membranous, oval-oblong,



Sarsaparilla.

obtuse leaves. These shrubs are natives of warm parts of America; *S. officinalis* and *S. papyracea* being found in South America, and *S. medica* on the Mexican Andes. Some botanists regard them as mere varieties of one species.

The part of the plant used in medicine is the dried root, of which the following are the characters, as given in the British Pharmacopœia: 'Roots not thicker than a goose-quill, generally many feet in length, reddish-brown, covered with rootlets, and folded in bundles about eighteen inches long, scentless; taste mucilaginous, feebly bitterish, faintly acrid.' S. has been analysed by various chemists, and appears to consist of volatile oil, most of which is expelled during the process of drying, of a white crystallisable neutral substance named *Smilacin*, whose composition is represented by the formula $C_{16}H_{14}O_6$, an acrid bitter resin, lignin, starch, and mucilage. S. is one of the class of medicines called Diaphoretics. The British Pharmacopœia contains three preparations of this drug—viz., the Decoction, the Compound Decoction (containing S., sassafras chips, guaiac wood-turnings, liquorice root, and mezereon), and the Liquid Extract. The cases in which they are serviceable are those of chronic rheumatism, secondary syphilitic affections, chronic skin diseases, &c. To be of any service, S. must be taken in considerable doses. The compound decoction, formerly known as the *Decoction of Sweet Woods*, is the best preparation, and should be taken in doses of four or six ounces three times a day.

The root of *S. aspera*, a native of the south of Europe, is used as a substitute for S., although of inferior quality, and is called Italian sarsaparilla.

The root of *Hemidesmus Indicus*, a climbing shrub of the natural order *Asclepiaceæ*, is used in India as a substitute for S., and is therefore called Indian sarsaparilla. The plant is common in all parts of India. The root has a peculiar aromatic odour and bitter taste. In consequence of the high price charged for genuine S., the root of *Hemidesmus Indicus*, or *Indian Sarsaparilla*, has been introduced into the British Pharmacopœia. The following are its characters: 'Yellowish-brown, cylindrical, tortuous, furrowed, and with annular cracks, having a fragrant odour, and a very agreeable flavour.' The only officinal preparation is the Syrup; but in India, where this root is highly esteemed as a diaphoretic and tonic, and is extensively used as a substitute for S., an Infusion, prepared by infusing two ounces of the root in a pint of boiling water, is generally employed, the dose being from two to four ounces three times a day. The syrup is chiefly used, in consequence of its pleasant flavour, as a vehicle for more active medicines.

In Germany, the roots of *Carex arenaria*, *C. disticha*, and *C. hirta* (see CAREX) are occasionally used as a substitute for S., under the name of German sarsaparilla.

SARTHE, an inland dep. of France, north of the Loire. Area 2395 sq. m.; pop. (1862) 466,155. It is a country of plains, traversed by low hills and by undulations clothed with vines, of large picturesque forests, and of pleasant valleys. The soil is fertile, productive in grain and in clover; hemp is cultivated, and hempen fabrics largely manufactured. The wine produced is of a mediocre quality. The climate is healthy and temperate. Clover-seeds are exported to England and Holland, and swine and cattle are reared in large numbers for the Paris and other markets. S. is divided into the four departments of Mans, La Flèche, Mamers, and St Calais. The capital is Le Mans. See MANS, LE.

SARTI, GIUSEPPE, one of the most skilful and learned musical composers of the 18th c., was born at Faenza in the Papal States in 1729. He studied under Padre Martini at Bologna; and in 1752 produced his first opera, *Il Re Pastore*, which was performed at Faenza with great success. He held for a time the office of *Hof Kapellmeister* at Copenhagen, but returned to Italy in 1765. In 1770, and the following years, he composed his principal operas, including *Le gelosie villane* and *Giulio Sabino*, the latter of which was enthusiastically received throughout Italy, and is highly praised by Dr Burney. In 1779, he became *maestro di capella* of the Duomo at Milan, and gave himself to the composition of church music. In 1784, he went to St Petersburg as music director of the court of the Empress Catharine, by whom he was treated with great liberality, and raised to the highest rank of nobility. He died at Berlin in 1802, on his way to Italy. His operas are thirty in number; but the composition by which he is now most known is his beautiful sacred terzett, *Amplius Lava Me*. S. was the musical instructor of Cherubini (q. v.).

SARTO, ANDREA DEL, one of the most famous painters of the Florentine school, was born at Florence in 1488. According to later writers, the family name was Vannucchi, and Andrea only received the name of *del Sarto* (the Tailor) from the occupation of his father; but this statement is probably erroneous. S. was a pupil of Piero di Cosimo, but formed his style mainly through study of the works of Masaccio, Domenico Ghirlandajo, and Buonarotti. These artists inspired him with a love of fresco-painting, in which he achieved great distinction. During 1509–1514, he executed a series of representations from the life of St Filippo Benizzi, in the porch of the Annunziata at Florence; and in these the characteristics of his genius—dignity of composition, purity of form, freshness of colour, and grace of expression—are seen at their best. In 1514 he commenced a series of frescoes from the life of John the Baptist, which were not finished, however, till 12 years afterwards. The finest works, of what may be called his middle period, are the 'Madonna di San Francesco' and the 'Contending Theologians,' both in the Florentine galleries. In 1518, Francis I. invited S. to Paris, where he painted, among other things, the picture of 'Charity' in the Louvre; but at the solicitations of his wife, he

returned to Florence, where he died in 1530. To the later years of his life, which were neither happy nor honourable, belong his 'Piety,' his most celebrated fresco the 'Madonna del Sacco' (in the Annuziata at Florence), the 'Madonna with Saints' (in the Berlin Museum), and the 'Sacrifice of Abraham' (in the Dresden Gallery). His largest fresco is the 'Lord's Supper,' in what was formerly the Abbey of San Salvi, near Florence.—See Reumont's *Andrea del Sarto* (Leip. 1835).

SA'RUM, OLD, an extinct city and borough of England, was situated on a hill two miles to the north of Salisbury, in Wiltshire. It dated from the time of the Romans, by whom it was known as *Sorbiodunum*, and remained an important town under the Saxons. A Witenagemôte was held at O. S. in 960; and here William the Conqueror assembled all the barons of his kingdom in 1086. It was the seat of a bishop from the reign of William the Conqueror till 1220, when the cathedral was removed to New Sarum, now Salisbury (q. v.), and was followed by most of the inhabitants. In Henry VII.'s time it was almost wholly deserted, and has so continued till the present time. Some traces of walls and ramparts, and of its cathedral and castle, are still seen. Though without a single house or inhabitant, two members represented it in parliament, till, like many other rotten boroughs, it was disfranchised by the Reform bill of 1832. William Pitt, Earl of Chatham, first sat in parliament for O. S. in 1735.

SARVÂSTIVÂDAS, or **SARVÂSTIVÂDINS** (lit., those who maintain the reality of all existence), is the name of one of the four divisions of the *Vaibhâshika* system of Buddhism; its reputed founder was *Râhula*, the son of *the* Buddha Sâkyamuni.—See C. F. Koeppen, *Die Religion des Buddha* (Berlin, 1857); and W. Wassiljew, *Der Buddhismus, seine Dogmen, Geschichte und Literatur* (St Petersburg, 1860).

SARZA'NA, a city of Northern Italy, in the province of Genoa, 8 miles east of Spezia. Its cathedral, built in 1200, is very rich in paintings and marbles. There is also an ancient fortress built by the Pisans in 1262. It is the birthplace of Pope Nicholas V. Pop. about 9000.

S. is a very ancient city, founded 176 B.C. The adjacent city of Luni having been sacked and destroyed by the Vandals and by the Normans, its inhabitants abandoned it, and took refuge in S., to which place they removed the episcopal see in 1204. There are still remains of the amphitheatre of Luni.

SASH, in the British Army, is a military distinction worn on duty or parade by officers and non-commissioned officers. For the former, it is of crimson silk; for the latter, of crimson cotton. It is tied on the right side by the cavalry, and on the left side by the infantry. In Highland regiments, the sash is worn over the left shoulder and across the body.

SASH. The frames in which the glass of windows is inserted are called window-sashes. Common windows are usually made with an upper and lower sash, contrived so that, by means of cords or chains, pulleys, and balance-weights, they slide up and down in a wooden case.

SASIN. See ANTELOPE.

SA'SINE. (See INFEFTMENT.) The ceremony was as follows: the attorney of the party giving the right produced his warrant of title, and gave it to the bailie or representative of the other party, who gave it to the notary to be explained by the latter to witnesses, and then the first party delivered earth and ground, that is, part of the very soil, to the other in presence of the witnesses. The notary then drew up an instrument reciting what had been thus done, and which was signed by the notary and two witnesses. In England, *seisin* never had so narrow and technical a meaning as it had in Scotland.

SASKA'TCHEWAN, a large, important, and only recently-explored river of British North America, draws its waters from the Rocky Mountains, and is formed by two head-waters called the South Branch or Bow River, and the North Branch. The South Branch issues from a lake about four miles long, fed by a glacier descending from a magnificent *mer de glace*, and by a group of springs in the vicinity. A few yards north of this group of springs is another group, from which the North Branch takes its rise. The height above the sea is 6347 feet; the lat., 51° 40′ N.; the long., 117° 30′ W. The South Branch flows south-east to its junction with the Belly River in long. 111° 40′ W., then north-east to its junction with the North Branch in long. 105° W. Fed mainly from the same glacier that feeds the South Branch, the North Branch flows north past Mount Murchison, 15,789 feet above sea-level, and one of the highest peaks of the Rocky Mountains, north through Kutanie Plain, a fine prairie abounding in game, and then flows in a general eastern direction to its confluence with the South Branch. From long. 105° W., the river flows east, and falls into Lake Winnipeg. Entire length stated at 1600 miles. From its mouth it is navigable (on the North Branch) to Rocky Mountain House, a distance of 1000 miles. It flows through a country rich in coal and iron, with a healthy climate, and comprising almost boundless plains suited to the cultivation of grain. At the sources of the S., there are several easily practicable routes across the Rocky Mountains, especially the mountain-road called Vermilion Pass, which is practicable for carts.—*Journal of the Geographical Society for* 1860.

SA'SSAFRAS (*Sassafras*), a genus of trees or shrubs of the natural order *Lauraceæ*, having diœcious flowers, a 6-parted membranous perianth, 9 stamens, a succulent fruit placed on the thick fleshy apex of the fruit-stalk, and surrounded by the unchanged perianth. The S.-tree (*S. officinale*) of North America, found from Canada to Florida, a mere bush in the north, but a tree of 50 feet in the south, has deciduous leaves, yellow flowers which appear before the leaves, and small dark-blue fruit. The wood is soft, light, coarse in fibre, dirty-white and reddish-brown, with a strong but agreeable smell, resembling that of fennel, and an aromatic, rather pungent and sweetish taste. The wood of the root possesses these properties in a higher degree than that of the stem, and the thick spongy bark of the root most of all. The wood is brought to market in the form of chips, but the bark of the root is preferred for medicinal use, is a powerful stimulant, sudorific, and diuretic, and is employed in cutaneous diseases, gout, rheumatism, and syphilis, generally in combination with other medicines. It contains a volatile oil, *Oil of S.*, which is often used instead. An agreeable beverage is made in North America by infusion of S. bark or S. wood; and a similar beverage was once very commonly sold at daybreak in the streets of London under the name of *Saloop*. A few saloop-venders are still to be seen plying their vocation. The leaves of S. contain so much mucilage that they are used for thickening soup.—Another species of S. (*S. parthenoxylon*), possessing similar properties, is found in Sumatra.

SASSAFRAS NUTS. See Pitchurim Beans.

SASSA'NIDÆ, the dynasty which succeeded that of the Arsacidæ on the throne of Persia (q. v.), derived its name from Sassan, the grandfather of the newly-elected monarch Ardishir. The reign of the Sassanidæ is remarkable in the history of Persia, not for the extent of their sway, or the luxury and magnificence of their court, though in these respects they could vie with the Achæmenidæ at the epoch of their greatest power and splendour, but for the intense energy which they succeeded in infusing into the people at large. A comparatively small army of Greeks might and did successfully strive against the immense hordes of a Xerxes and a Darius; but the veterans of Rome could gain no permanent laurels in a conflict with an equal force of Persians under the Sassanidæ. Ardishir made the desert of Khiva and the Tigris his boundaries, and resigned the throne to his son, Shahpur I. (Sapor) (240—273 A.D.), who subdued Armenia, took Algezira (258) and Nisibis, totally routed the Romans at Edessa, taking prisoner the Emperor Valerian and the relics of his army, and overrunning Syria, Cappadocia, and other portions of Western Asia. This monarch paid as much attention to the prosperity of his subjects and the encouragement of the fine arts as he did to the extension of his power; but his enlightened plans were not carried out by his immediate successors.—Narsi (Narses) (294—303) retook Armenia, and signally defeated the Romans under Galerius; but fortune deserted him in the following year (297).—His grandson, Shahpur II. (310—381), surnamed Posthumus, an infant, succeeded, and Persia, during his minority, was much harassed by the Arabs, Romans, and Tartars; but Shahpur had no sooner taken in his hands the reins of government, than in return, he ravaged Yemen, punished the Tartars, and took the sole revenge at that time in his power against the Romans, by commencing a dreadful persecution of the Christians in his dominions. A regular war speedily followed; the army of Constantius was routed at Singarah, and he was compelled to sue for peace. But the war continued; Constantius's successor, Julian, was defeated, and lost his life (363) near Ctesiphon, and the Romans were glad to conclude the humiliating peace of Dura. Armenia, Iberia, and the other Caucasian principalities were then reduced by Shahpur. The whole terror thus infused into the Romans effectually restrained them from aggressions for many years.—Among his successors were Baharam V. (420—448), surnamed Gour, who recommenced hostilities with the Romans, the result being a partition of Armenia and a truce for 100 years; and Kobad (Cobades or Cabades) (488—498, 502—531), a wise and able monarch, who, on the Romans refusing any longer to pay the stipulated tribute, declared war against them, and defeated them in every engagement, concluding peace (505) on receiving 11,000 lbs. of gold. A second war, which commenced in 521, was from beginning to end in favour of the Persians, though the Romans at that time possessed a staff of generals unsurpassed at any previous epoch of their history. The war continued for some time after the accession of Khusru I. (q. v.) (531—579), and was continued at intervals till nearly the conclusion of the century, when another great Persian conqueror, Khusru II. (q. v.) (591—628), ascended the throne; but the details of his annihilation of the Roman power in Asia, and the resistless march of Heraclius (q. v.), who again cooped up the Persians within the Tigris, and inflicted upon the S. a blow from which they never recovered, will be found under these names.—After four years of petty civil war, which wore out the remaining strength of the nation, Yesdigerd III. (632—651) was raised to the throne. The Arabs, who had already twice attacked Persia without success, made a third attempt in 639, and routed Yesdigerd's army at Kudseah (Cadesia) with immense loss. Yesdigerd made another energetic attempt to rescue his kingdom; but the great battle of Nahavend, in which more than 100,000 Persians are said to have been slain, extinguished all hope of success; and the unfortunate monarch became a fugitive and a wanderer in Northern Khorassan till 651, when he was treacherously murdered.—Thus perished the dynasty which had pulled down the Romans from their proud pre-eminence among nations by the hands of a horde of robber-fanatics, under whose barbarous rule the extensive commercial prosperity and refined civilisation which had been so carefully fostered for four centuries, were utterly swept away, leaving only such traces as ruined aqueducts, choked-up canals, and the still magnificent remains of almost forgotten cities.

SA'SSARI, a city in the north-west of the island of Sardinia, the chief town of the province of the same name, 8 miles from the shore of the Gulf of Asinara. It is a handsome and important archiepiscopal city, and has a vast cathedral, with many sculptures, one of which is by Canova; a university, founded in 1776; a college; and a rich library, with the MSS. of the Azuni. S. is a very busy town, and trades especially in grain, wine, fruits, wool, olive oil, and tobacco. Its harbour, Torres, is 10 miles north-west of S.; it is narrow and shallow, and does not admit large vessels. Pop. 25,086.

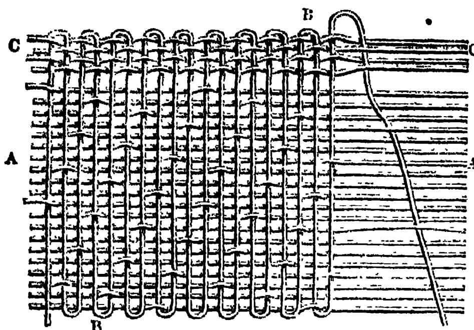
SATAN. See Devil.

SÁTÁRÁ, generally spelled *Sattara*, a collectorate in the Poona division of the Bombay presidency, British India, is bounded on the N. by the state of Poona, and on the W. by the lofty ridge of the Western Ghauts. Area, 11,000 sq. m.; pop. 1,220,000. Sátárá, the capital, from which the state derives its name, one of the most salubrious and pleasant stations in the Deccan, 133 miles south-east of Bombay. Pop. inconsiderable.

SA'TELLITES (Lat. *satelles*, an attendant) are certain celestial bodies which attend upon and revolve round some of the planets, as these latter revolve round the sun; and hence scientific men frequently apply to them the generic term, 'secondary planets.' The Earth, Jupiter, Saturn, Uranus, and Neptune, each possesses one or more of these attendants. The eclipses, inequalities, inclinations, and reciprocal attractions of the satellites, have been carefully noted from time to time, and the theory of their motions, at least of the most prominent of them, has been found to coincide with that of the moon. The satellites of Jupiter are invested with additional interest, from their eclipses having been the means of directing Römer to his great discovery of the successive propagation and velocity of light. On careful investigation, he found that the eclipses regularly happened 16′ 26″ earlier when the planet was in opposition (i. e., nearest the earth), than when it was in conjunction (i. e., furthest from the earth), a phenomenon which could only be accounted for by the supposition, that light requires 16′ 26″ to pass over a distance equal to the diameter of the Earth's orbit.

SATIN, a fabric in which so much of the weft is brought uppermost in the weaving as to give a more lustrous and unbroken surface to the cloth than is seen when the warp and weft cross each other more frequently; this will be better understood by reference to the figure than by any verbal description. A are the warp threads, of which only every tenth

one is raised to allow the shuttle to pass, but they are all raised in regular succession, so that the weaving is quite uniform throughout; B are the weft threads; and C is the selvedge, which is formed on each side of the piece of stuff by the



regular method of plain-weaving, that is, by raising every other warp thread for the passage of the weft. The term satin is very rarely applied to any other than silk fabrics, woven as described; but there are woollen, linen, and cotton satins known in the markets.

SATIN-BIRD. See BOWER-BIRD.

SA'TINET, an inferior satin, woven much thinner than the ordinary kind. The term is also occasionally applied to a variety of cloth woven with cotton warp and woollen weft.

SATIN-WOOD, a beautiful ornamental wood obtained from both the West and East Indies. The former is the better kind, and is supposed to be the produce of a moderate-sized tree, *Ferolia Guianensis*, and probably other species, as there are several varieties of the wood. That from the East Indies is less white in colour, and is produced by *Chloroxylon Swietenia*. Both are much used by cabinet-makers, and for marquetry, &c. The logs are usually only 6 or 7 inches square.

Chloroxylon Swietenia is a tree of the natural order *Cedrelaceæ*, growing on the mountains of the Circars in India, and in Ceylon. Sir James E. Tennent says that 'in point of size and durability, it is by far the first of the timber-trees of Ceylon. The richly-coloured and feathery logs are used for cabinet-work, and the more ordinary for building purposes, every house in the eastern province being floored and timbered with satin-wood.'—Tennent's *Ceylon*.

SA'TIRE (Lat. *sătira*; older form, *sătŭra*), the name given by the Romans to a species of poetry of which they may be considered the inventors. The word *satura* (from the root *sat*, enough) is strictly and originally an adjective, meaning 'full' or 'filled;' but afterwards it came to possess also a substantive signification, and denoted a dish filled with a medley of ingredients, like the *Pot-pourri* (q. v.) of the French, or the *Olla Podrida* (q. v.) of the Spaniards. Hence, in its figurative application to a branch of literature, it throws a light on the primary character of that literature. The oldest Roman satire was a medley of scenic or dramatic improvisations expressed in varying metres (Livy, lib. 7, cap. 2), like the Fescennine Verses (q. v.); but the sharp banter and rude jocularity of these unwritten effusions bore little resemblance, either in form or spirit, to the earnest and acrimonious criticism that formed the essential characteristic of the later satire. The earliest—so far as we know—who wrote *saturæ*, were Ennius (q. v.) and Pacuvius; but the metrical miscellanies of these authors were little more than serious and prosaic descriptions, or didactic homilies and dialogues. Lucilius (b. 148, d. 103 B.C.), is universally admitted to be the first who handled men and manners in that peculiar style which has ever since been recognised as the satirical; and the particular glory of Lucilius, in a literary point of view, consists in this, that he was the creator of a special kind of poetry, which in all subsequent ages has been the terror and aversion of fools and knaves. The serious, and even saturnine gravity of the Roman mind must have readily disposed it to a censorious view of public and private vices. After the death of Lucilius, satire, as well as other forms of literature, languished, nor do we meet with any satirist of note till the age of Horace (q. v.), whose writings are as a glass in which we behold mirrored the tastes and habits of the Augustan age. His satire, though sharp enough at times, is in the main humorous and playful. It is different when we come to Juvenal (q. v.)—a century later, when satire became a *sæva indignatio*, a savage onslaught on the tremendous vices of the capital. Persius (q. v.), who lived in the generation before Juvenal, is every way inferior, in force of genius, to the latter. After Juvenal, we have no professed satirist, but several writers, prose and poetic, in whom the satiric element is found, of whom Martial, the epigrammatist, is perhaps the most notable.

During the middle ages, the satirical element shewed itself abundantly in the general literature of France, Italy, Germany, England, and Scotland. Men who have a claim to the character of satirists, *par excellence*, are Ulrich von Hutten, one of the authors of the *Epistolæ Obscurorum Virorum* (q. v.), Erasmus (q. v.), Rabelais (q. v.), Sir David Lindsay (q. v.), George Buchanan (q. v.). In all of these writers, priests are the special objects of attack; their vices, their greed, their folly, their ignorance, are lashed with a fierce rage. But it was in France that satire as a formal literary imitation of antiquity first appeared in modern times. Vauquelin (q. v.) may be considered the true founder of modern French satire. The satirical verses of Mottin, of Sigogne, and of Berthelot, of Mathurin Regnier, *L'Espadon Satirique* of Fourqueraux, and *Le Parnasse Satirique*, attributed to Théophile Viaud, are very impure in expression, and remind us that at this time a satire was understood to be an obscene work—the 17th c. scholars supposing that the name had something to do with Satyr, and that the style ought to be conformed to what might be thought appropriate to the lascivious deities of ancient Greece! During the 17th and 18th centuries, both England and France produced professed satirists of the first order of merit, who have not been surpassed by the best either of their predecessors or successors. The names of Dryden (q. v.), Butler (q. v.), Pope (q. v.), and Churchill (q. v.) on this side of the Channel, of Boileau (q. v.) and Voltaire (q. v.) on the other, are too well known to require more than mention. Dr Edward Young (q. v.) and Dr Johnson (q. v.) have also made a name for themselves in this branch of literature. It may be noticed, however, as a distinguishing characteristic of Dryden, Boileau, Young, Pope, Churchill, and Johnson, and as a mark of the difference of the times in which they lived from those of the satirists of the Reformation, that it is no longer the church that is assailed, but society, political opponents, literary rivals, &c.; the war is carried on, not so much against bad morals in the clergy, as against the common vices of men in general, or is even the expression of partisan hatreds. Swift (q. v.) and Arbuthnot (q. v.) are perhaps as great satirists as any of those we have mentioned.

Satire in the shape of political squibs, lampoons, &c., is very abundant in the 17th and 18th centuries. Butler's *Hudibras* is simply one long lampoon against the Puritans; most of the playwrights of the Restoration were royalist satirists—unscrupulous and indecent partisans. Dryden himself was but *facile princeps* of the herd. Andrew Marvell (q. v.) is the most famous name on the side of liberty. The *Beggars' Opera* of the poet Gay is a piece of very fine political satire. Gifford (q. v.) and Wolcott (q. v.), better known as Peter Pindar, also deserve mention in a historical point of view, though their intrinsic merits are small. Incomparably superior to all their contemporaries, and among the first order of satirists, are Robert Burns (q. v.) and Cowper (q. v.).—Meanwhile, in France, since Voltaire, no great name has appeared, except, perhaps, that of Béranger (q. v.), though the spirit of satire has pervaded most of the current literature, more particularly political literature, of which the latest expression is the pamphlet recently published (1865) by M. Rogeard against the system of government pursued by Napoleon III., and entitled *Les Propos de Labienus*. In Germany, the most conspicuous modern names are those of Hagedorn, Rabener, Sturz, Stolberg (q. v.), Kästner, Wieland (q. v.), Tieck (q. v.), and Goethe (q. v.), but none of these have adhered very strictly to the classic models of satire. Of 19th c. satirists in England, the best names are Byron (q. v.), the brothers Smith (q. v.), and Hood (q. v.) in poetry; and Hook (q. v.), Jerrold (q. v.), Thackeray (q. v.), and Carlyle (q. v.) in prose. To these may be added the name of the author of the *Biglow Papers*, James Russell Lowell.—See Sellar's *Roman Poets of the Republic* (Edinb. 1863); Browne's *History of Roman Classical Literature* (Lond. 1853); Thomson's *History of Roman Literature* (forming a volume of the *Encyclopædia Metropolitana*); Mommsen's *History of Rome*; Niebuhr's *Lectures on Roman History*; M. Viollet le Duc, article 'Satire' in the *Dictionnaire de la Conversation*; and James Hannay's *Satire and Satirists*.

SA'TRAP, in the ancient Persian monarchy, was the governor of a province, whose power—so long as he enjoyed the favour of the king—was almost absolute. He levied taxes at his pleasure, and could ape the tyranny of his great master without let or hindrance. When the monarchy of Cyrus began to decline, some of the satraps threw off their slight allegiance, and founded independent kingdoms or sultanates of their own, the most famous of which in ancient times was the Mithridatic kingdom of Pontus. See PONTUS and MITHRIDATES.

SA'TURN, an ancient Italian divinity, who presided over agriculture. His name, from the same root as *satum* (*sero*, to sow), indicates what was probably one of the earliest personifications in the Italian religion, S. being the god who blessed the labours of the sower. His identification with the Greek KRONOS by the later Græcising myth-mongers is a peculiarly infelicitous blunder, and has led to more than ordinary confusion. The two have absolutely nothing in common except their antiquity. The Greek *Demeter* (Ceres), it has been observed, approaches far more closely to the Italian conception of the character of Saturn. The process of amalgamation in the case of Kronos and S. is visible enough. First, there is the Greek myth. Kronos, son of Uranos (Heaven) and Gæa (Earth), is there the youngest of the Titans. He married Rhea, by whom he had several children, all of whom he devoured at birth except the last, Zeus (Jupiter), whom his mother saved by a stratagem. The motive of Kronos for this horrible conduct was his hope of frustrating a prophecy which declared that his children would one day deprive him of his sovereignty, as he had done in the case of his father Uranos; but fate is stronger even than the gods, and when Zeus had grown up, he began a great war against Kronos and the Titans, which lasted for ten years, and ended in the complete discomfiture of the latter, who were hurled down to Tartarus, and there imprisoned. So ran the common myth. But other myths added, that after his banishment from heaven, Kronos fled to Italy, where he was received hospitably by Janus, who shared his sovereignty with him. At this point the Greek myth coalesced with the Italian. S., the old homely deity of the Latin husbandmen, was transformed into a divine king, who ruled the happy aborigines of the Italian peninsula with paternal mildness and beneficence, taught them agriculture and the usages of a simple and innocent civilisation, and softened the primitive roughness of their manners. Hence the whole land received from him the name of *Saturnia*, or 'land of plenty.' His reign was that 'golden age,' of which later poets sang as the ideal of earthly happiness, and in memory of which the famous *Saturnalia* (q. v.) were thought to have been instituted. At the foot of the Capitoline, where the fugitive god had formed his first settlement, there stood in historical times a temple dedicated to his worship. Ancient artists represented him as an old man, with long straight hair hanging down, the back part of his head covered, his feet swathed in woollen ribbons, and a pruning-knife or sickle-shaped harp in his hand. Other attributes, as the scythe, serpent, wings, &c., are of later invention.

SATURNA'LIA, an ancient Italian festival, instituted, according to the common belief of the ancients, in memory of the happy reign of Saturn (q. v.). Discarding all mythical explanations of the institution of the S. as simply incredible, and not worth the trouble of refutation, we may rationally conjecture that the S. was a rural festival of the old Italian husbandmen, commemorative of the ingathering of the harvest, and therefore of immemorial antiquity. It is not, we conceive, to be doubted for a moment that the untrammelled jollities of the S. were familiar to the farmers of Latium long before their homely national god, who blessed the labours of seedtime with abundant fruit, had been decorated with incongruous Hellenic honours, and transformed into a skyey Titan. Later ages may have introduced novel elements into the S. befitting the hybrid myth of king Saturn, but originally, no thoughtful investigator can doubt that the cessation from toil, and the wild self-abandoning mirth that marked the feast, were expressive of the labouring man's delight that the work of the year was over, and not of an artificial enthusiasm for a 'golden age' that never had been. The great feature of the S., as we know the festival in historical times, was the temporary dissolution of the ordinary conditions of ancient society. The distinctions of rank disappeared or were reversed. Slaves were permitted to wear the *pileus*, or badge of freedom, and sat down to banquets in their master's clothes, while the latter waited on them at table. Crowds of people filled the streets, and roamed about the city in a peculiar dress, shouting *Io Saturnalia*; sacrifices were offered with uncovered head; friends sent presents to each other; all business was suspended; the law-courts were closed; school-boys got a holiday; and no war could be begun. During the Republic, the S. proper occupied only one day—the 19th of December (xiv. Kal. Jan.). The reformation of the calendar by Julius Cæsar caused the festival to fall on the 17th (xvi. Kal. Jan.), a change which produced much

confusion, in consequence of which the Emperor Augustus ordained that the S. should embrace the whole three days 17th, 18th, and 19th of December. Subsequently, the number was extended to five, and even seven, though even in the times before the Empire, it would appear that the amusements often lasted for several days. But while the whole week was regarded in a general sense as devoted to the S., three distinct festivals were really celebrated—the S. proper; the *Opalia*, in honour of *Ops*, the wife of Saturn, and the goddess of field-labour (from *opus*, a work); and the *Sigillaria*, in which *sigilla*, or little earthenware figures, were exposed for sale, and purchased as children's toys. The modern Italian Carnival (q. v.) would seem to be only the old pagan S. baptised into Christianity.

SATU'RNIAN VERSE, the name given by the Romans to that species of verse in which their oldest poetical compositions, and more particularly the oldest national poetry, were composed. In the usage of the later poets and grammarians, the phrase has two different significations. It is applied in a general way to denote the rude and unfixed measures of the ancient Latin ballad and song, and perhaps derived its name from being originally employed by the Latin husbandmen in their harvest-songs in honour of the god Saturn (q. v.). In this sense, it simply means *old-fashioned*, and is not intended to determine the character of the metre. It is also applied to the measure used by Nævius, and a common opinion, sanctioned by the great name of Bentley, is, that it was a Greek metre introduced by him into Italy. But though the Saturnian verse is found among the measures employed by Archilochus, scholars generally incline to the opinion that this is an accidental coincidence, that the measure of Nævius is of Italian (Hermann even thinks of Etruscan) origin, and that it merely improved on the older ballad-metre—the primitive Saturnian verse. It continued in use down to the time of Ennius (q. v.), who introduced the Hexameter (q. v.). According to Hermann, the basis of the verse is contained in the following *schema*:

⏑ ⏑́ ⏑ – ⏑ ⏑́ ⏑ | – ⏑ – ⏑ – ⏑,

which, as Macaulay happily points out, corresponds exactly to the nursery rhyme,

The queén was in her párlour | éating bréad and hóney,

and is frequently found in the Spanish poem of the *Cid*, the *Nibelungen Lied*, and almost all specimens of early poetry; but in the treatment of it a wide and arbitrary freedom was taken by the old Roman poets, as is proved by the still extant fragments of Nævius, Livius Andronicus, Ennius, and of the old inscriptionary tables which the *triumphatores* set up in the Capitol, in remembrance of their glorious achievements.—See *History of Roman Literature*, by Thompson, Arnold, Newman, &c. (*Encyclopædia Metropolitana*, 1852); Browne's *History of Classical Roman Literature* (1853); Niebuhr's *History of Rome;* Preface to Macaulay's *Lays of Ancient Rome;* and Sellar's *Roman Poets of the Republic* (1863).

SATYRI'ASIS (see Satyrs) is the insanity, or the ungovernable sway of the lowest instincts and propensities, by which man becomes an animal in its savage and excited state. The ancients were acquainted with this loathsome form of alienation, in which man is the sport of foul and dangerous instincts, and recognises no law or hindrance to the promptings of hunger, thirst, or lust. It still appears at puberty and in dotage, but is more rarely met with; and its disappearance may be hailed as significant of the predominance of the higher sentiments, or of the subjection of propensities to law, decency, and decorum.—Mason Good, *Study of Medicine*, vol. v. p. 124; Sauvages, vol. ii. p. 214.

SA'TYRS, in Greek Mythology, were a race of woodland deities, first mentioned by Hesiod, who designates them—'the race of worthless Satyrs unfit for work.' Subsequently, they figure in great numbers in the train of Dionysus (Bacchus)—their leader being that model of tipsy revellers, the never-sober Silenus! In appearance, they were at once grotesque and repulsive, like all old woodland demons. They are described as robust in frame, with broad snub noses, large pointed ears like those of animals (whence they are sometimes called *theres*, 'wild beasts'), bristly and shaggy hair, rough skin, little horny knobs on their foreheads, and small tails. The S. are of course sensual in their inclinations, and ravishers of the woodland nymphs, fond of music, dancing, wine, and of the deep slumbers that follow a debauch. The Roman poets identified them with the *Fauni* of their own mythology, and gave them larger horns and those goats' feet with which they are so often represented. Ancient sculpture was fond of the Satyr as a 'subject'—one of the most famous specimens of ancient art being the Satyr of Praxiteles (q. v.).

SAUCES are preparations of various condiments, used for the purpose of giving piquancy and flavour to various kinds of food, chiefly animal. Sauces have been in use from the earliest times of culinary art. The ancients prided themselves much upon them, and used them almost wholly with fish. Sauces were used by the Greeks, but seem to have arrived at the summit of their reputation in the time of the Roman Empire, when that called *garum*, made from a fish called *garon* by the Greeks, probably the anchovy, was considered one of the greatest luxuries of the table. Besides the garum, many other sauces were made of the tunny and other fishes. In modern times, we have sauces in great variety: there are those ready prepared, as Harvey's, the Worcestershire, the Holyrood, &c., the basis of which is Ketchup (q. v.), which of itself is one of the most extensively known sauces; and there are a large number prepared, when wanted, by the cook, to suit every kind of dish sent to the table. These usually consist of rich gravies, thickened with flour or other materials, and flavoured with some suitable condiment. One of the reproaches of British cookery is the extensive use of a sauce called melted butter, which is usually little better than billstickers' paste, and which at the best is a little flour, water, and butter warmed together, and well mixed; and it is the habit to serve this to almost every kind of dish needing a sauce, whether animal or vegetable.

SAU'CISSON, or **SAUSAGE**, is a fascine of more than the usual length; but the principal application of the term is to the apparatus for firing a military mine. This consists of a long bag or pipe of linen, cloth, or leather, from one inch to one and a half inch in diameter, and charged with gunpowder. One end is laid in the mine to be exploded; the other is conducted through the galleries to a place where the engineers can fire it in safety. The electric spark is now preferred to the saucisson. See Blasting.

SAUER-KRAU'T, a preparation of the common white cabbage, well known and in extensive use in Germany and the north of Europe, where it supplies during the winter the place of fresh vegetables. The cabbages are gathered when they have formed firm white hearts; and these, sliced into thin shreds, are placed in a succession of thin layers in a cask, each layer being sprinkled with fine salt,

to which some add juniper berries, cumin seed, caraway seeds, or other condiment. A board is then placed on the top, with a heavy weight, so as to press the whole down firmly, but gently. After a time, fermentation begins; and when a sour smell arises from the cask, it must be removed into a cool place, and kept for use. It is generally eaten boiled, in the same way as fresh cabbage.

SAUL, the first king of Israel, was the son of Kish, a wealthy chief of the tribe of Benjamin. The circumstances that marked his election to the royal dignity are familiar to all the readers of Scripture, and need not be repeated here (see JEWS, SAMUEL). Gigantic in stature, noble in mien, and imperious in character, he appeared admirably fitted to accomplish the task of consolidating the dislocated tribes of Israel. His earlier achievements augured hopefully for his future. The deliverance of the men of Jabesh Gilead, above all, his victories over the Philistines, the Moabites, Ammonites, Edomites, and Amalekites, were unmistakable proofs of his vigorous military capacity, but gradually there shewed itself in the nature of the man a wild perversity—'an evil spirit of God,' as it is called—culminating in paroxysms of insane rage, which led him to commit such frightful deeds as the massacre of the priests of Nob. Samuel, who had retired from the 'court' of S., and had secretly anointed David as king, did not cease to 'mourn' for the wayward monarch; but nothing availed to stay his downward career, not even the noble virtues of his son Jonathan; and at last he fell in a disastrous and bloody battle with the Philistines on Mount Gilboa.

SAUMAREZ, JAMES, BARON DE, a celebrated naval hero, was descended from an old French family, which had long been settled in Guernsey, and was born there, 11th March 1757. He entered the navy as midshipman at the age of thirteen, and served in the American war (1774–1782), receiving for his gallantry at the attack of Charleston (1775) the grade of lieutenant; but he was recalled before the end of this war, and placed under Sir Hyde Parker. He did good service in the action off the Dogger Bank (August 1781), and was rewarded with promotion to the rank of commander, being soon afterwards placed under the orders of Admiral Kempenfeldt on the Jamaica station. At the great fight between Rodney and De Grasse (12th April 1782), S. commanded the *Russell*, a line-of-battle ship, and gained much distinction by his coolness and intrepidity throughout. For his gallant capture of the French frigate *La Reunion*, with one inferior in size and equipment, he received the honour of knighthood; and in command of the *Orion*, a seventy-four, he served under Lord Bridport at the battle of l'Orient, June 23, 1795. He also took a prominent part in the battle off Cape St Vincent (February 14, 1797), and was second in command at the battle of the Nile, in which he was severely wounded. In 1801, he became a baronet, and vice-admiral of the blue; and in the same year he fought his greatest action off Cadiz (July 12), defeating a French-Spanish fleet of 10 line-of-battle and 4 frigates, with a squadron less than half their strength, and causing to the enemy a loss of 3000 men and three ships. This contest, than which, according to Admiral Nelson, 'a greater was never fought,' gained for S. the Order of the Bath, the freedom of the city of London, and the thanks of parliament. In the Russian war, he commanded the Baltic fleet, and took or destroyed two large Russian flotillas (July 1809). In 1814, he became admiral, vice-admiral of Great Britain in 1821, was created a peer in 1831, and died at Guernsey, 9th October 1836. His life has been written by Sir John Ross (*Memoirs of Admiral Lord de Saumarez*, 2 vols., 1838).

SAUMUR, a town of France, on the left bank of the Loire, in the dep. of Maine-et-Loire, 28 miles south-east of Angers by railway. Bridges connect the town with a suburb on the right bank of the river. The river-side is lined with handsome quays, and there are good bridges and agreeable promenades. There is an imperial riding-school, in which riding-masters for the army are trained. Upwards of 600 workmen are employed in the manufacture of rosaries of cocoa-nut shell and beautiful articles in enamel. Its trade is in spirits, wines, hemp, and linen. Pop. (1862) 12,342.

S., formerly the capital of the province of Saumurois, was a stronghold of the Protestants during the reign of Henry IV., at which time it contained 25,000 inhabitants. Its prosperity was annihilated by the revocation of the Edict of Nantes, and its population reduced to a fourth. Perhaps the most striking event in the history of the town was its brilliant capture by Larochejaquelein and the Vendeans, June 10, 1793. In this action, the victors, with but a slight loss, captured 60 cannon, 10,000 muskets, and 11,000 republicans.

SAUNDERSON, NICHOLAS, LL.D., a distinguished English scholar, was born at Thurleston in Yorkshire in 1682. He became blind from small-pox at the age of twelve months, but received a good education, including instruction in the classics, which was orally communicated. His strong predilection for mathematics becoming known to his friends, attempts were made with success to instruct him in arithmetic, geometry, and algebra, by means of ingenious mechanical contrivances which it is not necessary to describe. In 1707, he came to Christ's College, Oxford, as a teacher, and there delivered a series of lectures on the Newtonian philosophy, including (strange to say) a discussion of Newton's theory of optics. Four years afterwards, he succeeded Whiston as Lucasian professor, and died 19th April 1739. A valuable and elaborate treatise on Algebra, from his pen, was published in 1740 (2 vols., 8vo), and another on Fluxions, including a commentary on some parts of Newton's *Principia*, in 1756. The mental process by which he was enabled to understand the rules of perspective, the projections of the sphere, and some of the more recondite propositions of solid geometry, seem to have been peculiar to himself, and was almost wholly unintelligible to others.

His sense of feeling was extremely acute; and he is said even to have been able to distinguish, by this sense alone, true Roman medals from counterfeits. He could judge fairly of the size of a room and of his position in it by the sound of his own footsteps, and could tell, in some inexplicable manner, when light clouds were passing across the sun's disc.

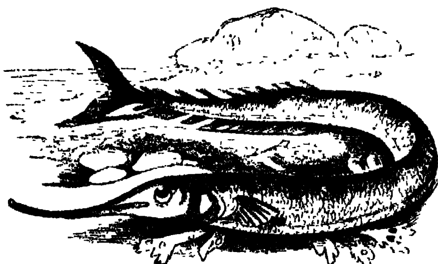
SAU'RIA, in the systems of Cuvier and other recent naturalists, an order of Reptiles (q. v.), having an elongated body, covered with scales or with bony plates; a more or less elongated tail; four limbs, or sometimes only two apparent, the rudimentary hind-limbs being concealed beneath the skin; the mouth always furnished with teeth; the ribs movable, rising and falling in respiration; the young issuing from the egg in a form similar to that of the mature animal.—To this order belong Crocodiles, Alligators, &c.; Chameleons, Geckos, Iguanas, Agamas, Varans, Teguixins, Lizards, Skinks, &c., numerous families, some of which contain many genera and species. Crocodiles and their allies,

being covered with bony plates instead of overlapping scales, are by some naturalists removed from amongst the Saurians, and a place nearer to the Chelonians is assigned to them. In their general form and structure, however, they correspond with Saurians, and have no resemblance to Chelonians. The recent S. are far excelled in size and in variety of strange forms by the fossil S., as the *Plesiosaurus*, *Ichthyosaurus*, &c.

SAURIN, JACQUES, a celebrated French Protestant preacher, was born at Nîmes, 6th January 1677, studied at Geneva, and was chosen minister of a Walloon church in London in 1701. But the climate of England did not agree with his delicate health; and in 1705 he settled at the Hague, where his extraordinary gift of pulpit oratory was prodigiously admired, but not by his clerical brethren, who enviously assailed him with the accusation of heresy. The ground of their charge was that S. had attributed falsehood to God. Commenting in a thesis on the conduct of Samuel (1 Sam. chap. xvi.) when about to proceed to Bethlehem to anoint David, S. had pointed out that God certainly induced the prophet to adopt such measures and such language as could not but lead King Saul to believe what was not true. He argued, however, that the 'will of God' can never command what is criminal or wrong, and that this deception—this falsehood, as men would call it—was quite innocent and permissible. S.'s logic is not perhaps quite faultless, but he at least deserves credit for not denying the existence of a moral difficulty. The dispute was carried to the synod of Hague, and S. was subjected to a series of petty persecutions that shortened his days. He died at the Hague in 1730. As a preacher, S. has often been compared with Bossuet, whom he rivals in force, if not in grace and subtlety of religious sentiment. His chief productions are: *Sermons sur divers Textes de l'Ecriture Sainte* (La Haye, 1708—1725); *Nouveaux Sermons sur la Passion* (Rotterdam, 1732); *Discours sur les Evénements les plus mémorables du V. et du N. T.* (Amst. 1720—1728); *Abrégé de la Théologie et de la Morale Chrétiennes en Forme de Catéchisme* (Amst. 1722); and *État du Christianisme en France* (La Haye, 1725).

SAU'ROID FISHES, a name sometimes employed to designate fishes which approach in their structure to saurian reptiles. Of recent S. F., examples are found in Bony Pikes (q. v.) and Sturgeons (q. v.). Fossil S. F. are numerous, some of them of very large size. The teeth of *Megalichthys* are nearly four inches in length, far exceeding those of any existing fish, and bony plates of the same fish have been found five inches in diameter.

SAU'RY PIKE (*Scomberesox*), a genus of fishes of the order *Pharyngognathi* and family *Scomberesocidæ*, having the body greatly elongated, and


Saury Pike (*Scomberesox saurus*).

covered with minute scales; the head also much elongated, and the jaws produced into a long sharp beak, as in the Garfish (q. v.); from which, however, the present genus differs in the division of the dorsal and anal fins into finlets, as in mackerels. One species (*S. saurus*) is common on the British coasts. It is about fifteen inches long, the back dark-blue, the under parts white; the fins dusky-brown. It approaches the coast, and enters firths in shoals, which are pursued by larger fishes, porpoises, &c.; and in order to escape from these, the S. P. often leaps out of the water, or rushes along the surface, for a distance of one hundred feet, scarcely dipping or seeming to touch the water. Hence the name SKIPPER, which it very commonly receives on the British coasts. Vast shoals sometimes enter bays, so that they may be taken by pailfuls, and great numbers are sometimes found among the sludge at the ebbing of the tide, in the upper parts of the Firth of Forth and elsewhere. The flesh of the S. P. is palatable.

SAU'SAGE, a well-known preparation of the flesh of various animals for culinary purposes. It is made by chopping the raw meat very fine, adding salt and other flavouring materials, and often bread-crumbs also, the whole forming a pasty mass. This is pressed into portions of the intestines of the animal, previously thoroughly cleaned and properly prepared. Usually, a considerable length of the intestine is filled and divided into separate sausages, by constricting it with pieces of string, at short intervals. The sausages of Lucania were very celebrated amongst the Romans. They were made of fresh pork, and bacon chopped fine, with nuts of the stone-pine, and flavoured with cumin-seed, pepper, bay-leaves, various pot-herbs, and the sauce called garum. Italy is still celebrated for its Bologna sausages, and with many people the smoked sausages of Germany are highly prized; but except when quite fresh, sausages cannot be recommended as wholesome food.

SAUSAGE-POISON. It is well known that sausages made or kept under certain unknown conditions are occasionally highly poisonous; and in Germany, where sausages form a staple article of diet, fatal cases of sausage-poisoning are by no means rare. The symptoms are slow in appearing, three or four days sometimes elapsing before they manifest themselves. The poison may be described as of the narcotico-irritant character, and is very dangerous. Dr Taylor, in his *Medical Jurisprudence*, records the cases of three persons who died from the effects of liver-sausages which had been made from an apparently healthy pig, slaughtered only the week before. The inspection threw no light on the cause of death. This case differs from those commonly occurring in Germany in this respect, that here the sausages were fresh, while the sausages which have proved poisonous in Germany had always been made a long time. Dr Kerner, a German physician, who has specially studied this subject, believes that the poison is an acid formed in consequence of a modified process of putrefaction; others regard it as an empyreumatic oil.

SAUSSURE, HORACE BENEDICT DE, a celebrated Swiss physicist and geologist, was born at Conches, near Geneva, 17th February 1740. His education was attended to with such success that, in 1762, young S. obtained the chair of Physics and Philosophy in the university of Geneva. In 1768, he commenced the famous series of journeys which were fraught with such important consequences to science and to his own reputation; and during the course of which he visited the Jura and Vosges Mountains, those of Germany, England, Italy, Switzerland, Sicily, and the adjacent isles; the extinct craters of Auvergne, &c.; and traversed

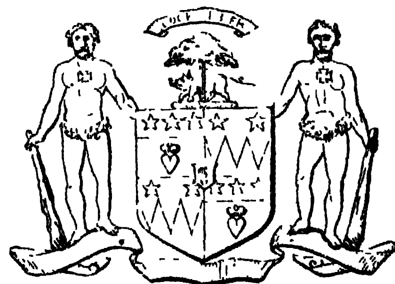
the Alps no less than 14 times, crossing them by 8 different routes. He was the first 'traveller' who ever ascended to the summit of Mont Blanc; he camped for 17 days on the Col du Géant, and finished his Alpine achievements by the ascent of Monte Rosa in 1789. During this extensive course of travel, he made numerous observations on the minerals, physical features, botany, and meteorology of the mountain ranges he visited; and these observations were found, after having undergone a searching examination, to be as correct and valuable as they were numerous. In short, they put the science of geology for the first time on a basis of fact. The work in which they are found is entitled *Voyages dans les Alpes*, &c. (Neufchatel, Geneva, Paris, 1779—1796, 4 vols.), and is much admired for its accurate and splendid descriptions of Alpine scenery. His observations were not made without considerable preliminary labour, for he found it necessary to improve his thermometer, hygrometer, eudiometer, electrometer, anemometer, and to invent other two instruments—viz., the cyanometer and diaphanometer, before his investigations, which were conducted with much care and candour, produced satisfactory results. In 1786, S. resigned his chair; and in 1798 was appointed Professor of Natural History in the Central School of the *department of Leman* (formed on the annexation of Geneva to France); but four years afterwards, he was struck with paralysis, and after a long period of suffering, died at Geneva, 22d January 1799. Besides the great work above mentioned, he wrote numerous others, the chief of which are: *Observations sur l'Écorce des Feuilles et des Pétales* (1762); *De Præcipuis Errorum nostrorum Causis, ex Mentis Facultatibus Oriundis* (1762); *De Electricitate* (1766); *De Aqua* (1771); *Sur l'hygrométrie* (1783), which, according to Cuvier, is one of the most important contributions to science in the 18th c.; and in which S. set forth his discovery of the dilatation in bulk, and diminution in specific gravity, of air charged with moisture. His 'Description of the Alps,' a portion of his great work, was published separately in 1834, at Geneva and Paris.

SAUTRÂNTIKA is the name of the second of the four great schools or systems of Buddhism, the three others being called *Vaibhâshika*, *Madhyamika*, and *Yogâchâra*. They recognise the authority of the *Sûtras* (q. v.), but reject that of the Abh[illegible].—See C. F. Koeppen, *Die Religion des Buddha* (Berlin, 1857); and W. Wassiljew, *Der Buddhismus, seine Dogmen, Geschichte und Literatur* (St Petersburg, 1860).

SAVAGE, RICHARD, an English poet, was born in London on 16th January 1696–1697. He was the fruit of an illicit intercourse between Lord Rivers and the Countess of Macclesfield, which resulted in the divorce of the lady, and the declared illegitimacy of her offspring. Lord Rivers, though permitting his name to be given to the child, seems not to have concerned himself further with him at all; and at the hands of his mother he met with only the grossest neglect. To the interference of *her* mother, Lady Mason, he was indebted for his education, received at the grammar-school of St Albans. Afterwards, he was apprenticed to a shoemaker in Holborn, but an accident revealing to him the secret of his birth, he quitted this obscure handicraft. Repeatedly and in vain he appealed to the tender sympathies of his mother, who declined even to see him, and withheld all acknowledgment and assistance.' Failing other means of subsistence, he turned his attention to literature, and at an early age produced several comedies, which met with but little success. Somewhat more fortunate was his tragedy of *Sir Thomas Overbury*, which, though indifferently received on the stage, with the author himself as actor of the leading part, obtained in print some approval, and put a little money in his purse. In 1727, he killed a man in a drunken tavern brawl—an offence for which he was tried, and sentenced to death. A pardon was, however, obtained for him on the intercession of the Countess of Hertford with the queen, and the details of his story becoming widely known, a strong feeling arose in his favour. Though his mother continued inexorable, and would, it was thought, have been well pleased to be rid of him by the hands of the hangman, certain of her relations interested themselves in him, and he was received into the household of Lord Tyrconnel, who allowed him £200 a year, and otherwise treated him with considerate generosity. His poem, *The Wanderer*, was now published; its success was great, and for a time the career of Savage was prosperous, and even brilliant. But it did not very long remain so. The inveterate irregularity of his habits involved him in difficulties with Lord Tyrconnel, and they parted with mutual recriminations. After this, he sunk irretrievably. Though he failed in an attempt to obtain the post of poet-laureate, a poem which he wrote to commemorate her birthday so pleased the queen, that along with 'a permission to write annually on the same subject,' she conferred on him a pension of £50 a year. This sum, which might have been to him the basis of a modest subsistence, it was his regular habit to dissipate in a week's debauchery, passing the rest of his year in what disreputable fashion he could. On the failure of his pension by the death of the queen, a subscription was set on foot, mainly through the influence of Pope, with the view of sending him to live quietly at Swansea in Wales. Thither, accordingly, he retired; but happening to visit Bristol, where he lived in the reckless manner habitual to him, he was arrested for a debt of £8, and died in prison there, on the 31st July 1743.

The poetry of S., though a few vigorous lines of it continue to be remembered, is scarcely such as of itself would have sufficed for a permanent reputation. His most powerful and finished piece is *The Bastard*, in which, when he had finally broken with the relations of his mother, he held her up to public execration. Such celebrity as still attends his name he owes, however, almost entirely to the masterly life of him by Dr Johnson, who, in the time of his own early struggles, was thrown much into his society.

SAVAGES, or WILD MEN, in Heraldry, are of frequent occurrence as supporters. They are represented naked, and also, particularly in the later



Savage (the Douglas Arms).

heraldry, are usually wreathed about the head and middle with laurel, and often furnished with a club in the exterior hand. Savages are especially

prevalent in the heraldry of Scotland. In more than one of the Douglas seals of the first half of the 15th c., the shield is borne in one hand by a single savage, who acts as sole supporter.

SAVA'NNAH, a city and port of Georgia, U.S., on the right bank of the Savannah River, 18 miles from its mouth, 90 miles south-west of Charleston, lat. 32° 5′ N., long. 81° 5′ W. It is built on a sandy plain, 40 feet above the river, with broad streets shaded by beautiful trees. Its chief edifices are the custom-house, city exchange, court-house, state arsenal, theatre, St Andrew's Hall, Oglethorpe Hall, market, hospitals, and asylums. In 1860, the exports were 18,351,554 dollars, consisting of cotton, rice, lumber, naval stores, &c. The harbour admits vessels of 14 feet draught to the wharfs; larger ships discharge and load 3 miles below. The city is surrounded by marshes and islands, and was defended by Fort Pulaski and Fort Jackson. S. was founded in 1733 by the English general, Oglethorpe. In 1776, a British fleet, attempting to take the town, was repulsed after a severe action; but it was taken in 1778, and held in 1789 against the combined French and American forces. In the war of Secession, after many unsuccessful attacks by sea, it was taken by General Sherman in February 1865. The population in 1860 was 22,290.

SAVANNAH, a river which forms the boundary between Georgia and South Carolina, U.S., rises in the Alleghanies, on the south-western border of North Carolina, and flows south-east to the Atlantic. Its length is 300 miles, navigable to Augusta.

SAVANNAHS (Span. *savana* or *sabana*), the name given by the early Spanish settlers to the great plains or prairies (q.v.) of the North American continent.

SAVARY, ANNE JEAN MARIE RENÉ, Duc de Rovigo, a French general and diplomatist, was born at Marcq, in Ardennes, 26th April 1774, entered the army as a volunteer in 1790, and served with distinction in the army of the Rhine. In 1797, he accompanied Desaix to Egypt as *chef d'escadron*, and remained under his command as long as that general lived. After the battle of Marengo (1800), Napoleon made him his aide-de-camp, and for several years employed him only in political affairs, for which he shewed an admirable capacity. In 1803, he was made general of brigade; in 1804, as commandant of the troops stationed at Vincennes, he presided at the execution of the Duc d'Enghien, an event which he is believed to have unduly hastened; and in the Prusso-Russian Austrian wars of 1806—1808, he acquired high military reputation, his victory at Ostrolenka (February 16, 1807) being really a brilliant achievement. Created Duke of Rovigo in the beginning of the following year, he was sent to Spain by the emperor, and negotiated the perfidious arrangement by which the Spanish king and his son were kidnapped. In 1810, he replaced Fouché as Minister of Police. After the fall of Napoleon, to whom he had always been passionately, and, we may add, unscrupulously devoted, he wished to accompany him to St Helena; but he was confined by the British government at Malta for seven months, when he succeeded in making his escape, and getting on board a ship, was landed at Smyrna. After experiencing several vicissitudes, he returned to Paris in 1818, and was reinstated in his titles and honours. In 1823, he removed to Rome; but at the close of 1831, he was appointed commander-in-chief of the army of Africa, and during his brief administration of affairs in Algeria, exhibited a splendid energy and generalship. But ill-health forced him to withdraw to France in March 1833, and on the 2d of June following, he died at Paris. S.'s *Mémoires* (Par. 8 vols. 1828) are among the most curious and instructive documents relating to the period of the Empire.

SAVE, a river of the south of Austria, and an important affluent of the Danube, is formed by two upper waters, which rise in the extreme north-west of Carniola, and unite at Radmannsdorf 1560 feet above sea-level. The river then flows south-east through Carniola, passing Laibach (at which point it becomes navigable), and forming in part the boundary between Carniola and Styria, after which it enters and traverses Croatia; and at its confluence with the Unna, first touches the Turkish dominions, the northern boundary of which it continues to form throughout the remainder of its course to its junction with the Danube at Belgrade. Entire length, 644 miles. Its principal affluents are the Laibach (200 miles long), Kulpa, Unna, Bosna, and Drina.

SA'VELOY, a kind of sausage common in the London shops; it only differs from pork sausages in being made of young *salted* pork, and is highly seasoned, a little saltpetre being added to give the contents a red colour.

SAVIGLIA'NO, a city of Northern Italy, province of Cuneo, 9 miles east of Saluzzo. It is situated on the Maira and the Grana, and is a handsome and clean town. Cloth and silk are extensively manufactured, and the country in the vicinity is productive in wines and grain. Cattle are reared in great numbers, and silk-worms are bred largely. Pop. 17,634.

SAVIGNY, FRIEDR. KARL VON, an illustrious writer on Roman jurisprudence, was descended from a French Calvinistic family, that had emigrated to Germany in 1622, to avoid religious persecution, and was born at Frankfurt, 21st February 1779. He studied at Marburg, and took his degree in 1800, after which he commenced a series of lectures on juridical subjects, which were attended by a numerous auditory. Struck, in his exposition of the Digest, with the divergence existing between the text and the commentaries on the theory of possession, he composed in 1803 his masterly treatise, *Das Recht des Besitzes*, in which the Roman law is disengaged from the extraneous elements introduced into it by Germanic law, common usage, and the misapprehensions of commentators. Its merit was quickly recognised, and S. received the most advantageous offers from different universities, which, however, he declined, in order to prosecute researches in the libraries of France and Germany, with a view to a historical development of the glosses of commentators. He was assisted in this laborious undertaking by his pupil, Jakob Grimm, and his young wife, a daughter of the poet Clem. Brentano, and Bettina von Arnim. Appointed Professor of Law at Landshut in 1808, he was called, two years afterwards, to Berlin, on the reorganisation of the university, and there he continued to lecture with unbroken success for a period of 32 years, in the course of which he filled various important offices in the university and the state, and died 25th October 1861, at the age of 82. S. is the virtual founder of the new historical school of writers upon jurisprudence, although it is but fair to admit that Hugo and Schlosser had preceded him in the same direction. The essential idea of this school is, that 'law' or 'right' is not an abstract and absolute rule, manifesting itself under the same forms in all countries, but that it is one

of the forces of society, with which it changes, according to fixed laws of development that are beyond the caprices of the day. This idea, when worked out historically, has produced the most important and original results, and may even be said without exaggeration to have regenerated the science of jurisprudence. S.'s principal writings are: *Vom Berufe unserer Zeit fur Gesetzgebung und Rechtswissenschaft* (Heidelb. 1815); *Geschichte des Römischen Rechts im Mittelalter* (6 vols. Heidelb. 1826—1831); *System des heutigen Römischen Rechts* (8 vols. Berl. 1840—1848); *Das Obligationenrecht* (1851—1853), and *Vermischte Schriften* (5 vols. Berl. 1850), a collection of essays which had originally appeared in the *Zeitschrift fur Historische Rechtswissenschaft*, and elsewhere.

SA'VINE (*Juniperus Sabina*, see JUNIPER), a low, much-branched, and very widely-spreading shrub, with very small, imbricated, evergreen leaves, which grows on mountains in the south of Europe and the East. It bears small black berries, covered with a pale blue bloom. Its foliage has a strong, fetid, aromatic, penetrating odour, particularly when rubbed. Its exhalations cause headache. The part of the plant used in medicine is the tops of the branches, collected in spring, and dried. Their odour is strong, peculiar, and unpleasant, and their taste acrid, bitter, resinous, and disagreeable. The therapeutic properties of S. are due to the volatile oil which it contains. Two pounds of the tops yield about five ounces of this oil, which is limpid and nearly colourless, having the odour of the plant, and a hot acrid taste. Its composition is $C_{10}H_8$, being isomeric with oil of turpentine.

S. exerts a stimulating effect on the uterine organs, and is employed with much benefit in cases of amenorrhœa and chlorosis, depending upon want of tone in those parts. It is best given in the form of the oil, one or two minims of which may be prescribed in a pill, to be taken twice a day. This drug is often employed by the lower classes for the purpose of procuring abortion; but it ought to be generally known that if it is given in a sufficiently large dose to produce the desired effect, the life of the mother is placed in the greatest possible peril. If a poisonous dose has been given for this or any other object, emetics should first be employed to remove any of the drug that may remain in the stomach, after which opiates and demulcents should be prescribed, and a general cooling and lowering treatment adopted. S. in the form of ointment is much used as an external application, with the view of keeping up the discharge from a blistered surface. The ointment cannot, however, be kept long without losing its properties.

SAVINGS-BANKS. The application of the banking-system to the middle and humbler classes of society was commenced by individual exertions long before the legislature took cognizance of the matter. In 1799, the Rev. J. Smith, rector of Wendover in Bucks, as a means of inducing habits of prudence and frugality among his parishioners, offered, with two other inhabitants, to receive weekly any sum not less than twopence; and if the amount were not touched before the next following Christmas, to add one-third to it as a bonus or encouragement. Of course, such a plan could only be applicable for a limited time and for small sums. Other attempts followed, more or less involving the principle of charity; until, in 1810, the Rev. H. Duncan established a Parish Bank Friendly Society at Ruthwell (Scotland), more resembling a modern savings-bank than anything which had preceded it. A minute account of its organisation and mode of operation drew so much attention to it, that, by the year 1817, there were 78 establishments somewhat resembling it in the United Kingdom.

The first savings-banks' acts were passed in 1817, one for England and Wales, and one for Ireland. A fund, called the Fund for the Banks for Savings, was opened with the National Debt Commissioners; and into this fund were to be placed all savings-banks' deposits as soon as they reached £50. On these sums the National Debt Commissioners gave £4, 11s. 3d. per cent. interest (3d. per cent. per diem). The trustees and managers of the savings-banks in most cases allowed the depositors 4 per cent., the difference being applied to the working expenses. As it was considered that all such institutions were established for a benevolent rather than a commercial purpose, the trustees and managers were not allowed to make any profit out of the transactions. In England, each depositor's amount in one year was limited to £50 after the first year, which might be £100; but in Ireland, the first and all other years' deposits were to have a limit of £50.

This, the fundamental statute on the subject, has been modified and extended in many ways since. In 1824, as it was found that the benefits of the savings-banks' system were reaped by persons for whom it was not intended, an act was passed declaring that the deposits in the first year should not exceed £50; that those in subsequent years should not exceed £30; that no interest would be allowed on any excess beyond £200; and that no person would be allowed to make deposits at more than one savings-bank. In 1828, an act was passed to give greater security to the depositors. The rules drawn up by the trustees and managers of all savings-banks were to be submitted to a barrister appointed by the National Debt Commissioners, and without his approval, no savings-bank could commence or continue operations. The justices of the peace had also a veto in the matter; and the clerk of the peace was to keep a certified copy of the approved rules and regulations. The money deposited in savings-banks was to be invested in the Bank of England or of Ireland, in the name of the National Debt Commissioners. The trustees were to receive £3, 16s. 0½d. per cent. interest (2½d. per cent. per diem), and were to pay the depositors not exceeding £3, 8s. 5¼d. interest (2¼d. per cent. per diem). No depositor was to deposit more than £150; but compound interest might accumulate until the total reached £200. Friendly societies and charitable institutions were, however, permitted to invest to the amount of £300.

In 1833, an act was passed to enable savings-banks to manage the granting of small deferred annuities, to be paid for by weekly, monthly, quarterly, or yearly instalments. In 1835, another act extended the operation of the statutes of 1828 and 1833 to Scotland, and enabled existing savings-banks to conform to the stipulations without a necessity for reorganisation.

In 1844, a new act made extensive changes in the savings-banks' system, the chief items of which may thus be summarised: Interest allowed by the commissioners to trustees to be reduced to £3, 5s. 0d. per cent., and by trustees to depositors to £3, 0s. 10d. per cent.; every depositor's book to be sent once a year to his savings-bank for examination; the extent of the liability of trustees, managers, actuaries, and cashiers exactly defined; arrangements for making deposits in trust for other persons; annuities under the act of 1833 not to exceed £30 for any one person, but separate annuities to that amount may be granted to a husband and wife; deposits made by a married woman may be returned to her, unless the husband give notice to the contrary;

rules laid down concerning the inheritance of the deposits of intestate and illegitimate persons; payments to the relations of intestate depositors to be made to the next of kin according to the law of Scotland, if in that country. An act passed in 1848 placed a limit on the liability of trustees of savings-banks in Ireland. In 1853, an act placed the maximum and minimum of savings-banks' annuities at £30 and £4 respectively; and allowed a husband and wife to purchase a joint-annuity, although one of them may have already had an annuity of the full amount. Another act in 1860 authorised the National Debt Commissioners to invest the moneys received by them from savings-banks in any kind of stock, debenture, or other security that has received parliamentary sanction; and required them to make an annual return to parliament of all such transactions. The act of 1861, establishing Post-office Savings-banks, contained provisions for the transfer of deposits from the one kind of savings-banks to the other. By another statute passed in 1863, the arrangements for deposits in the name of a minor are defined; the order of proceedings is settled whereby any savings-bank may be wound up and closed, and the claims of the depositors transferred to the Post-office Savings-banks; and slight changes are made in the mode of managing savings-banks' annuities and transfers of deposits.

From time to time, as the above-named statutes came into operation, the National Debt Commissioners have laid down rules for giving them practical effect, and the registrar of savings-banks has exercised the necessary supervision. The rules on the important subject of savings-banks' annuities may be thus briefly noticed: The nominee's age must not be under 15; no annuity below £4, and the aggregate of annuities to any one person not to exceed £30; by purchasing two half annuities instead of a whole one, the annuitant may receive his money in four quarterly sums; on the death of the annuitant, a sum equal to one-fourth part of the annuity will be paid to his or her next representative, if claimed within two years; if the purchaser of an annuity is unable to continue his instalment of payments, he may either receive back the whole of his money without interest, or may have an immediate or deferred annuity equivalent in amount to the moneys which he has paid; if the purchaser of a deferred life-annuity die before the annuity becomes due, the whole amount of his payments, but without interest, is paid to his family; an annuity is not transferable, except by a bankrupt to his creditors, from whom it will be purchased by the National Debt Commissioners at its proper value; if an annuitant becomes insane, the trustees of savings-banks are empowered to make weekly payments for his benefit, under certain conditions.

These institutions have wrought vast benefit, by inducing habits of economy among the working-classes. It will suffice to take three years equidistant apart—viz., 1833, 1848, and 1863—to shew the rate at which the operations have extended. On November 20, 1833, there were 484 savings-banks, holding balances belonging to 475,155 depositors; the sum in hand was £15,715,111, giving an average of more than £33 due and belonging to each depositor; these totals applied to England, Wales, and Ireland, but did not include Scotland. On November 20, 1848, there were 582 savings-banks in the United Kingdom, holding balances belonging to 1,044,927 depositors; the sum in hand was £27,809,429, giving an average of about £27 due and belonging to each depositor; the deposits in England were nearly ten times as large in amount as those of the other three sections of the United Kingdom combined. On November 20, 1863, there were savings-banks in the United Kingdom holding balances belonging to 1,555,089 individual depositors, charitable institutions, and friendly societies; the sum in hand (including interest) was £43,278,656, giving an average of about £28 due and belonging to each depositor. The charitable institutions and friendly societies which had accounts open with savings-banks were so large in number as 28,334, having deposits of about £100 each on an average. About 300,000 depositors had accounts open of less than £5 each. There were 6627 savings-banks' annuities then in force, for an aggregate sum of £135,748 per annum; in other words, the annuities were more than £20 each on an average.

Just before the new Post-office savings-banks came into operation, there were 1,609,103 depositors in the old savings-banks; this number increased to 1,887,510 by March 31, 1864—shewing that, so far from an injury, the system has been a positive benefit to the old. There is evidently room for both. Taking the old and the new savings-banks together, there is 1 depositor for every 7 inhabitants of the London postal district, 1 for every 14 in England and Wales, 1 for every 17 in Scotland, and 1 for every 68 in Ireland. It would appear that the Post-office savings-banks are suitable for smaller deposits than the others, judging from the sums deposited since the two systems have been in operation together; they will therefore reach a lower social stratum of the people.

POST-OFFICE SAVINGS-BANKS.—Mr Sikes, of the Huddersfield Banking Company, in a paper read before the Congress on Social Science, held at Bradford in 1859, advocated the establishment of savings-banks in connection with the money-order department of the General Post-office. The subject had more or less occupied the attention of public men since 1806, when Mr Whitbread made a proposition relating to it; but Mr Sikes's plan was so clear and detailed, that the Postmaster-general took the matter up. An act of parliament was obtained in 1861. The Postmaster-general is to act in concurrence with the Treasury and the National Debt Commissioners. Deposits not less than one shilling in amount may be made at any of the money-order offices, or at such offices as the Postmaster-general may appoint. Each depositor is provided with a deposit-book; each deposit is entered in this book, and is attested by the receiving-officer and by the dated stamp of his office. The amount received is reported on the same day to the Postmaster-general. An acknowledgment of each deposit is transmitted to the depositor, and this is to be conclusive evidence of his claim to repayment with interest. The depositor is entitled to repayment of the whole or any part of the deposit, on making a demand in a prescribed form at *any* of the offices (not necessarily the one at which he made his deposits) within ten days at furthest after sending in the demand. The names of the depositors, and the amounts paid in and returned, are not to be disclosed except to the officials immediately concerned. All the moneys are paid into and received back from the National Debt Office, on the authority of the Postmaster-general. Interest at 2½ per cent. is allowed on all deposits as soon as they amount to £1, but none on fractional parts of £1. Facilities are supplied by means of certificates for transferring deposit accounts from ordinary savings-banks to Post-office savings-banks, or *vice versâ*. All expenses are refunded to the Post-office out of the deposit fund; and if there should be any deficiency, the Consolidated Fund is to bear it. A detailed account of the proceedings is to be presented annually to

parliament. The maximum sum deposited by any one person in one year is limited to £30. The deposit-book, in which the name, address, and occupation of the depositor are written, contains minute printed directions for his guidance. The book contains a pocket, in which the receipts from the Postmaster-general are recommended to be kept. The depositor pays nothing for the book, and nothing for postage for letters to and from the Postmaster-general.

This new system has proved remarkably convenient and successful. Operations commenced on September 16, 1861; and by the 31st of March 1864, the numbers stood thus: 372,955 accounts then open; £4,097,492 accumulated deposits and interest. Tabulated as to sections of the United Kingdom, they were as follow:

	P. O. S. Banks.	Depositors.	Due to Depositors.
England and Wales,	2160	339,633	£3,828,804
Scotland,	354	18,683	107,932
Ireland,	510	14,639	160,756
	3024	372,955	4,097,492

It will be seen, from these figures, that Scotland and Ireland have not yet embraced this new system except to a very small extent. Nearly 2000 Friendly, Provident, and Charitable Societies, and several Penny Banks, now deposit their funds in the Post-office savings-banks. It is gratifying to know that this new system is not a mere transfer of deposits from the old savings-banks; it is almost wholly an addition to them.

Military and Naval Savings-banks.—The ameliorating influence of savings-banks has been brought to bear upon soldiers and sailors by special enactments. In 1842, an act was passed for establishing military savings-banks, to be managed in connection with the regimental pay departments. Reports are annually presented to parliament in relation to these banks. Another act was passed in 1859, affording greater facilities to the frugal soldier, and leading to a large increase in the deposits. The proceedings of these banks in recent years present the following figures:

	Deposits in Year.	Withdrawals in Year.
1859,	£70,736	£64,497
1860,	163,491	116,393
1861,	167,136	149,090
1862,	152,203	775

These accounts are made up to the end of the military year, March 31, and therefore consist principally of transactions in the preceding *civil* year. In March 1863, the accumulated sum, consisting of deposits and interest, due to individual depositors and to army charitable funds, amounted to £279,091.

Concerning seamen's savings-banks, they mainly depend for their provisions on an act passed in 1856, which recognised the shipping-offices for seamen as branch savings-banks; and authorised the Board of Trade to lay down rules with respect to the persons entitled to become depositors, the making and withdrawal of deposits, &c. The operations of the seamen's saving-banks are far less extensive in amount than those of the military savings-banks. Recent years have exhibited the following figures, made up to the end of what may be called the savings-bank year, November 20. (This termination of the year on different dates throws great confusion into official returns):

	Deposits in Year.	Withdrawals in Year.
1859,	£13,539	£8,417
1860,	14,959	9,653
1861,	17,112	12,681
1862,	17,089	15,343
1863,	17,098	14,090

The fund in hand, by the excess of deposits over withdrawals, accumulated to £36,068 by November 20, 1863.

SAVOIE. See Savoy.

SAVO'NA, a maritime city of Northern Italy, in the province of Genoa, and 25 miles south-west of the city of that name. It is situated on a plain near the sea, and has numerous manufactures. The soil produces olives, fruits, grain, wood, and wines. It carries on a brisk trade with Marseille. The port of S., begun in 1197, is one of the safest harbours in the Mediterranean. At first it had from 25 to 30 feet depth of water, but the envious Genoese, in the 16th c., contrived to fill it with stones, and now it is only about 5 feet deep. A fortress defends the harbour; and, as many vessels touch there, S. has many European consulates. Pop. 19,611. S. is a very ancient city, and in the time of the Romans was called Sava, founded, according to tradition, by Janus, flourished under the Roman empire, was destroyed by Rotharis (639), was rebuilt by Ludovic the Pious (981), and was afterwards laid waste by the Saracens.

SAVONAROLA, Jerome, the celebrated preacher, and political as well as religious reformer of Florence, was born of a noble family at Ferrara, September 21, 1452. He was educated at home, and, at a very early age, became deeply versed both in the philosophy of the schools and in the old Greek philosophy, which at that time had become popular in Italy; but his disposition from the first was strongly tinged with religious asceticism, and, in 1474, he formally withdrew from secular affairs, and entered the Dominican order at Bologna. Having completed his novitiate, and the studies of the order, his first public appearance as a preacher seems to have been in 1482, at Florence, where he had entered the celebrated convent of his order, San Marco, and where he preached the Lent in that year. His first trial, however, was a signal failure. His voice was harsh and unmusical, and he so utterly failed to interest his hearers, that, after a time, the course of lectures was entirely deserted. Some time afterwards, S. was sent to a convent of his order at Brescia, where, by degrees, his earnestness and zeal began to attract notice, and eventually, the disadvantages of manner and address, which had told against the effect of his early efforts, either were overcome through practice, or ceased to be felt under the influence of his sterling genius and irresistible enthusiasm. In 1489, he was once more recalled to the convent of San Marco at Florence. His second appearance in the pulpit of San Marco was a complete success. The great subject of his declamation was the sinfulness and apostacy of the time; and in his denunciation of the vices and crimes of his age, he took as his theme what has been the topic of enthusiasts in almost every age, the mystical visions of the Apocalypse, which he applied with terrible directness to the actual evils with which, as with a moral deluge, the age was inundated; and in these half-expositions, half-prophetical outpourings, his followers claimed for him the character of an inspired prophet. Under the rule of the great founder of the family of the Medici, Lorenzo the Magnificent, art, literature, and philosophy had all followed the common direction of that elegant but semi-pagan revival, which the scholars of the 15th c. had inaugurated; and the whole spirit of the social as well as intellectual movement of which Florence, under the Medici, was the centre, was utterly at variance with the lofty Christian spirituality and severe asceticism in which S. placed the very first conditions of the restoration of true religion and morality. His preaching, therefore, in its spirit, as well as in its

direct allusions, was no less antagonistic to the established system of the government, than to the worldly and irreligious manners of the age; the visions and predictions ascribed to him had quite as much of political applicability as of religious significance; and thus, to the aristocratic adherents of the Medici, S. early became an object of suspicion, if not of antipathy and dread. It is said by Pico de Mirandola, that he refused to grant absolution to Lorenzo, when the latter lay dying in 1492; but the statement does not accord with Poliziano's account of his patron's death. Through all this time, however, S.'s relations with the church were, if not of harmony, at least not of antagonism; and when, in the year 1493, a reform of the Dominican order in Tuscany was proposed under his auspices, it was approved by the pope, and S. was named the first general vicar. About this time, however, his preaching had assumed a directly political character, and the predictions and denunciations which formed the staple of many of his discourses, pointed plainly to a political revolution in Florence and in Italy, as the divinely ordained means for the regeneration of religion and morality. In one of his discourses, he pointed plainly to the advent of the French under Charles VIII.; and when this prediction was fulfilled by the triumphant appearance of the French expedition, S. was one of a deputation of Florentines to welcome Charles VIII. as the saviour of Italy, and to invite him to Florence. Very soon, however, the French were compelled to leave Florence, and a republic was established, of which S. became, although without political functions, the guiding and animating spirit, his party, who were popularly called *Piagnoni*, or 'Weepers,' from the penitential character which they professed, being completely in the ascendant. It was during this brief tenure of influence that S. displayed to the fullest extent, both the extraordinary powers of his genius, and the full extravagance of the theories to which his enthusiastic asceticism impelled him. The republic of Florence was to be the model of a Christian commonwealth, of which God Himself was the chief ruler, and His Gospel the sovereign law; and thus the most stringent enactments were made for the repression of vice, and of all the sinful follies by which it is fomented and maintained. All the haunts of debauchery were suppressed; gambling in all its forms was prohibited; the vanities of dress were restrained by sumptuary enactments; and, under the impulse of the popular enthusiasm which the enthusiasm of the prophet engendered, women flocked in troops to the public square to fling down their costliest ornaments; and gay gallants and grave scholars destroyed, in one common *auto da fé* before the gates of the cathedral, whole hecatombs of the amatory poetry or licentious fiction of the day, in conjunction with the elegant paganism or unconcealed immorality of the classic period. Meanwhile, the extremes of his rigorism; the violence of his denunciations, which did not spare even the pope himself; the assumption by him, or attribution to him, of a supernatural gift of prophecy; and the extravagant interpretation of the Scripture, and especially of the Apocalypse, by which he sought to maintain his views, drew upon him the displeasure of Rome. He was cited, in the year 1495, to answer a charge of heresy at Rome; and on his failing to appear, he was forbidden to preach; the brief by which the Florentine branch of his order had been made independent, was revoked; and he was again summoned to Rome. Once again S. disregarded this order. But his domestic difficulties now began to deepen. The measures of the new republic proved impracticable. The party of the Medici, called 'Arrabbiati' (Enraged), began to recover ground. A conspiracy for the recall of the exiled House was formed; and although, for the time, it failed of success, and six of the conspirators were condemned and executed, yet this very rigour served to hasten the reaction. The execution of these conspirators was a direct violation of one of S.'s own laws, and it tended to direct the popular sympathy in their favour. At the critical point of the struggle of parties came, in 1497, a sentence of excommunication from Rome against Savonarola. S. openly declared the censure invalid, because unjust, and refused to hold himself bound by it. In the following year, however, 1498, when the new elections took place, the party opposed to S., the Arrabbiati, came into power. He was ordered to desist from preaching; and the struggle was brought to a crisis by the counter-denunciations of a preacher of the Franciscan order, long an antagonist of S., Francesco da Puglia. In the excited state of the popular mind thus produced, an appeal was made by both of the contending parties to the interposition of divine providence by the ordeal of fire. But at the moment when the trial was to have come off, difficulties were originated by the party of S., and nothing was actually done. The result of this was to destroy, with the populace, the prestige of S.'s reputation, and to produce a complete revulsion of public feeling. In the midst of this reaction, he was cited before the council, and brought to trial for misleading the people by false prophecies. He denied the charge; but being threatened with torture, he is said to have made a confession, which, however, his friends say was garbled, if not utterly falsified. He was declared guilty of heresy and of seditious teaching. The acts of the trial were sent to Rome, where the sentence was confirmed; and he, with two others of his order, were given up to the secular power. An effort was made to procure a remission of the capital sentence which was passed upon them, but in vain; and on May 23, 1498, this extraordinary man, with his two companions, F. Domenico da Pescia and Silvestro Marufli, were executed, and their bodies burned by the executioner. They died professing their adherence to the Catholic Church, and humbly accepting the last absolution from the papal commissary; and it is still a question among Catholics, whether S. is to be regarded in the light of a confessor of the truth, or of a fanatical forerunner of the movement which so soon reached its full development in the Reformation. The works of S. are very numerous. They were all written either in Latin or in Italian, but have for the most part been translated into French, German, Spanish, and other languages. His works in Latin are: (1.) *On the Simplicity of the Human Soul*; (2.) *The Triumph of the Cross*; (3.) *A Dialogue of the Spirit and the Soul*; (4.) *A Fourfold Exposition of the Lord's Prayer*; (5.) *On the Perfection of the Spiritual Life*. Most of them were translated contemporaneously into Italian, and some even by S. himself. His principal Italian works are: *A Treatise on Humility*, *On the Love of Jesus Christ*, *On the State of Widowhood*, *Two Treatises on Prayer*, *Rules of Christian Living* (together with a work of a title almost the same which he wrote while in prison, and at the desire of his jailor), *On the Mysteries of the Mass*, and several other doctrinal and ascetical treatises. No collected edition of his sermons has been published, and his correspondence also has, for the most part, disappeared; but the works which survive sufficiently illustrate the peculiarities of his genius, and the stern and almost fierce enthusiasm which was the secret of his influence on that corrupted but yet cultivated age.—See Madden's *Life of Savonarola* (2 vols. 8vo, 1854); Abbé Carle's

Histoire de Fra Hieron Savonarola (Paris, 1842); Revere's *I Piagnoni e gli Arrabbiati al Tempo de Savonarola* (2 vols., Milan, 1843).

SAVONETTES, soap of fine quality, perfumed and made into balls or other shapes, for use at the toilet.

SAVORY (*Satureja*), a genus of plants of the natural order *Labiatæ*, nearly allied to Thyme (*Thymus*), and differing from it in the regularly 5-toothed or 5-cleft calyx, and the stamens bent together into an arch under the upper lip of the corolla. The species are herbaceous and half-shrubby plants, all natives of the south of Europe and the East. They have narrow, linear-lanceolate, entire leaves, with resinous dots, and short, axillary, little corymbs. The COMMON S., or SUMMER S. (*S. hortensis*), is commonly cultivated in kitchen-gardens for flavouring dishes. It is an annual plant, $\frac{1}{2}$—1 foot high, with leaves not prickly pointed, and lilac or white flowers; has a strong and agreeable aromatic smell, and an aromatic pungent taste, and is in common use both fresh and dried for flavouring dishes, and especially for flavouring beans. It is stomachic and tonic.—WINTER S. (*S. montana*) is used exactly in the same way. It is a half-shrubby plant, with prickly-pointed leaves and larger flowers. Its taste is pungently aromatic.—Summer S. is propagated by seed; winter S. by slips and cuttings.

SAVOY, a cultivated variety of CABBAGE (q. v.), forming a large close head like the true cabbages, but having wrinkled leaves. A number of sub-varieties are in cultivation. The mode of cultivation and the uses are the same as those of cabbage. Savoys are much cultivated for winter use; they require a light rich soil.

SAVOY, formerly a duchy belonging to the kingdom of Sardinia (q. v.), now incorporated with France, is bounded on the N. and E. by Switzerland, E. and S. by Piedmont, and W. by the French departments of Isère and Ain. While an Italian duchy, it was politically divided into seven provinces, a division which exhibited the successive steps of its acquisition by the House of Savoy; but since its annexation to France this division has been modified, though the change has been little more than nominal. It is now separated into two departments: first, SAVOIE, or CHAMBERY, the southern part of S., with an area of 2282 sq. m., and a pop. of 275,039, which is divided into four arrondissements—Chambery (old province of *Chambery*), Albertville (*Alta-Savoia*), Moutiers (*Tarantasia*), and Saint Jean de Maurienne (*Maurienne*)—and has Chambery for its capital; secondly, HAUTE-SAVOIE, or CONFLANS, the northern part of S., which has an area of 1319 sq. m., with a pop. of 267,496, and is divided into four arrondissements—Bonneville (*Fossigni* or *Faucigny*), Thonon (*Ciablese* or *Chablais*), Annecy and St Julien (*Genevese*)—Annecy being the capital. The two departments resemble each other so much in all respects, that they may be described together.

S. is the most elevated tract in Europe, and is mostly covered with mountains, which break up the country into a number of valleys, each watered by its own snow-fed torrent or stream. The highest elevation of S. is the summit of Mont Blanc (q. v.), and the lowest is the bank of the Rhone at Saint-Genix d'Aosta, 670 feet above sea-level. The Graian Alps run along the eastern boundary of S., and form a natural barrier between it and Piedmont, several breaks or gorges affording means of communication between the two countries; from this range, the mountains gradually decrease in height towards the valley of the Rhone, which is on the western boundary. S. (especially Haute-Savoie) is extremely picturesque, and within a comparatively limited space, exhibits at once the curious, the beautiful, the grand, and the wild and forbidding phases of natural scenery. There we have the lakes of Geneva, Annecy (9 miles by $1\frac{1}{2}$), Aiguebellette, each perfect in its own style of beauty; the subterranean lakes of Bauge, the cascades of Sallanches and Bout-du-monde, the intermittent springs of Pigros and Haute-Combe, the grottoes of Balme, Bauge, and Sallanches, the hot springs of Aix-le-bains (near Chambery), of Saint Gervais, Bride, Echaillon, and others; the smiling valleys of Chambery, Faverge, Maglan, and Albertville; the glaciers of Chamounix, Buet, and Upper Tarantasia; the wooded mountain-sides of Ciablese, the bare rugged peaks which surround Mont Blanc, the frowning gorge of Challes, and the wild and savage glens and dells of Maurienne. Tourists consequently flock in great numbers to S., the robust to gratify their love of sight-seeing, and the invalids to benefit by the thermal springs, which are much esteemed.

The whole of the country is drained by streams which flow either into Lake Leman (the northern boundary) or the Rhone. Chief of the former is the Drance, which traverses Chablais; among the latter are the Arve, which drains the Chaumonix valley, the Usses, the Fier, the Laisse, the Guier, and the Isère. The geology of S. is marked by the presence of three distinct ranges, exhibiting respectively the primary, transition, and secondary series of rocks with great completeness; and the depth of the crevasses, the height of the mountains, inversions of strata, débris on the mountain-sides, afford excellent opportunities for a thorough study of the constitution and elements of the earth's crust.

The whole of S. is broken up into a multitude of small estates, and the country is, as a consequence, most carefully cultivated, some of the fertile valleys resembling a continuous garden abounding in flowers and fruits. The ground suitable for cultivation being very limited the enterprising natives have made extraordinary efforts to increase it by constructing line above line of parapets along the steep mountain-sides, and by filling in earth behind, forming long and narrow terraces, on which, if they can succeed in growing two rows of vines, they consider themselves well rewarded for their labour. These terraces are most common in the hilly districts of Tarantasia and Maurienne.

The climate of S. is in general cold, the winters are long and severe, and the summers frequently follow without an intermediate spring. Yet S. can boast of the vegetation of warm countries, as well as of that of higher latitudes; the vine is found growing almost to the edges of the glaciers, and cereals and fruits of various sorts are produced in great perfection. The pasturage is rich and abundant, and mulberry trees are largely planted. Although it is essentially an agricultural country, the industrial arts are not unrepresented; fabrics of cotton, printed calico and gauze, stockings, felt-hats, woollen cloth, are manufactured in various localities; and tanneries, breweries, distilleries, glass-works, potteries, &c., are occasionally met with. The chief occupation, however, is the breeding of cattle, horses, and mules, all of which are much esteemed, and fetch good prices; and bees and silkworms are tended as a source both of amusement and profit.

S. is rich in minerals—silver, iron, copper, antimony, manganese, lead, zinc, asphalt, marble, granite, gypsum, sulphur, and salt. The principal mines are the spathic iron-mine of Saint Georges d'Hurtieres, and the lead-mine of Macot. Coal is found in Maurienne.

The exports consist of the surplusage of these

products, and also of cheese, hemp, silk both raw and spun, and wood of various sorts. S. is, with the exception of Bavaria, the only country of Europe in which advanced education is given gratuitously, there being within the country 14 colleges for this purpose. Ordinary education is also well provided for, as more than 1200 schools exist, nearly the whole of which are supported on old foundations.

The Savoyards are honest, intelligent, religious, hospitable, and enthusiastically patriotic, even to a greater extent than the Swiss. More than 20,000 of them expatriate themselves annually for the purpose of pursuing various callings, but the greater portion return early in summer, while others wait till they have amassed wealth sufficient for the rest of their lives.

SAVOY, House of. The small territory of Savoy, formed a part of ancient Gaul, and after the decline of the Roman power, was seized by the Burgundians (407 A. D.), and along with Burgundy, passed under the Franks (534). On the breaking up of the Frankish empire, Savoy was joined to *Transjurane Burgundy*, and along with that kingdom was united to *Cisjurane Burgundy*, or Arles. On the accession of the last king of Arles to the imperial throne as Conrad II., the great lords of North-western Italy, such as the lords of Suza, Chablais, Maurienne, and Turin, became vassals direct of the empire. The counts of Maurienne, the ancestors of the House of S., are generally believed by most historians who have investigated their genealogy to have descended directly in the male line from a son of Wittekind the Great, the last independent king of the Saxons; and Count Humbert, *the White-handed*, was the first of the family who, by the addition of Chablais and Valais (grants from the Emperor Conrad the Salic) to his hereditary lordship of Maurienne, rose to high position among the princes of Northern Italy. One of his descendants, Humbert II. (1078—1103), succeeded to the marquisate of Suza (which included the greater part of Piedmont), and further increased his little territory by the conquest of Tarantasia. The family now commenced to form alliances with the royal Houses of France, Portugal, England, Naples, Spain, and Germany, which added greatly to its political importance. Amadeus III. (1103—1149) received from the Emperor Henry V. the title of Count of Savoy (1111), and his grandson, Thomas I. (1188—1233), obtained important accessions in Chambery, Turin, the country of Vaud, and many other lordships. Count Thomas was the initiator of the policy so long and successfully adopted by his successors, 'of preserving armed neutrality in all contests between France and the Empire, and of vigorously supporting the Empire against the papacy.' From this time, the counts of Savoy became the arbiters of all quarrels in North, and occasionally in South Italy, and their bravery in the field, and keen political sagacity,* increased at once their political influence and their territorial jurisdiction. After the death of Count Boniface in 1263, without heirs, his uncle, Pietro, the Earl of Richmond and lord of Essex, usurped the crown; but in 1285, the rightful heir, Amadeus V. (1285—1323), the grandson of Pietro's elder brother, obtained the succession; and his grant to his brother Thomas of the principality of Piedmont as a hereditary fief, founded the two lines of Savoy and Piedmont, which continued to rule over their respective territories till, on the latter becoming extinct in 1418, Piedmont reverted to the elder line. (See Amadeus V., VI., and VIII.) Amadeus VIII. was the first Duke of Savoy, being so created by the Emperor Sigismond in 1416. Charles I. (1482—1489) obtained from Charlotte of Lusignan, queen of Cyprus, the transference of her rights, and from this date (1485) the dukes of Savoy also claimed to be kings of Cyprus and Jerusalem. The elder male line becoming extinct in 1496, the next collateral heirs were Philibert II. (1496—1504) and Charles III. (1504—1553); but the latter, having sided with Charles V. against Francis I. of France, was deprived of the duchy of Savoy in 1533, the countries of Valais and Geneva placed themselves under the protection of Switzerland, and in 1536 the country of Vaud was seized by the people of Bern. But his son, Philibert Emmanuel, who was the Spanish governor in the Netherlands, succeeded, at the peace of Cateau-Cambresis (1559), in obtaining repossession of Savoy. It was this duke who attempted to convert the Vaudois (q. v.), and who founded the now important silk-production in Piedmont, besides, to the utmost of his power, encouraging the prosecution and development of other branches of industry. He re-annexed (1576) the principality of Oneille, and conquered the county of Tende. His successor, Charles Emmanuel I. (1580—1630), was celebrated as a scholar, statesman, and warrior, but he was cursed with an inordinate ambition, which involved him in unfortunate contests with Geneva (a former town of Savoy, of which he wished to regain possession), with the French, who in revenge took possession of his dominions, and with the Spaniards. His two sons, Victor Amadeus I. (q. v.) (1630—1637) and Thomas, were the respective founders of the two lines of Savoy and Savoy-Carignan. Victor Amadeus speedily regained the dominions which his father had lost; and with the consent of France, added to them Montferrat, Alba, and some other places, relinquishing Pignerol, La Perouse, Angrone, and Lucerne to the French. As generalissimo of the French army in Italy, he gained two victories over the Spaniards, but died soon after. His grandson, Victor Amadeus II. (1675—1730), was one of the claimants for the Spanish throne on the extinction of the Spanish-Hapsburg dynasty (see Succession, War of the Spanish); and by his adroit policy in the contest between the Hapsburgs and Bourbons for the possession of this crown, he succeeded in obtaining extensive additions to his little territory, the chief of these being Alessandria, Val-di-Sesia, and other portions of the Milanese, the island of Sicily in 1713, and along with this latter the title of king. He and his descendants were also recognised as the legitimate heirs of the Spanish throne, should the Bourbon dynasty ever become extinct. But in 1720 he was compelled to surrender Sicily to Austria, in exchange for the island of Sardinia, which, along with Savoy, Piedmont, and his other continental possessions, was then erected into the Kingdom of Sardinia (q. v.).

SAVOY CONFERENCE, the name given to an ecclesiastical conference held in 1661 at the Savoy Palace (so called because built in 1245 by Peter, Earl of Savoy and Richmond [see Amadeus]; burned by Wat Tyler in 1381, it was rebuilt and endowed in 1505 as an hospital for poor persons) between the Episcopalian and Presbyterian divines, with the view of ascertaining what concessions would satisfy the latter, and thereby lead to 'a perfect and entire unity and uniformity throughout the nation.' During the rule of the Protector Cromwell, the Church of England had been in a very anomalous condition. Most of the clergy who held office during the early period of the Civil Wars were strong royalists, and either were ejected or fled, when the cause of the parliament

* It is a remarkable fact, in connection with the history of this family, that they have numbered among them more great warriors and politicians than any other royal House of Europe.

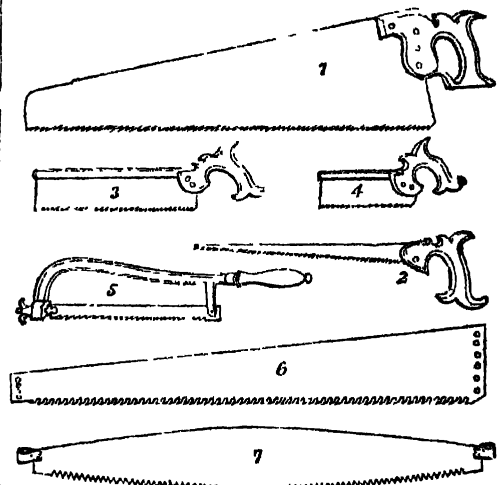
triumphed. Their places had been supplied in many cases by zealous Presbyterians—a rather numerous body in England at that time, and thus it happened at the restoration of Charles II. that a considerable section of the ministers *within the church* were hostile to the re introduction of Episcopalian order and practice. Aware of this feeling, yet desirous of not adopting severe measures, if such could possibly be avoided, the king issued letters-patent dated 25th March appointing twelve bishops, with nine clergymen as assistants on the side of the Episcopal Church, with an equal number of Presbyterian divines, 'to advise upon and review the *Book of Common Prayer.*' Among the Episcopalian commissioners were Frewen, Archbishop of York, Sheldon, Bishop of London, Gauden of Exeter, Reynolds of Norwich, &c.: among their assistants, Dr Peter Heylin, Dr John Pearson, and Dr Thomas Pierce. The most notable representatives of the Presbyterian party were Richard Baxter, Dr John Wallis (then Savilian Professor of Geometry at Oxford), Edmund Calamy, William Spurstow, and Matthew Newcomen. The Conference (which lasted four months) was opened on the 13th of April. The Presbyterians (according to Burnett) demanded that Archbishop Usher's scheme of a 'reduced Episcopacy,' in which the elements of the Scotch system of presbyteries, synods, and general assemblies were combined with distinctions of ecclesiastical ranks, should be made the basis to begin with; that responses should be given up; that the prayers in the Litany should be combined into one; that no lessons should be taken out of the Apocrypha; that the psalms read in the daily service should be according to the new translation; that the term regeneration (among others) should be struck out of the baptismal service; and that the use of the surplice, of the cross in baptism, of godfathers as sponsors, and of the holy days, should be abolished. They were told in reply that the commission had no authority to discuss questions affecting the government of the church, such as were contained in Archbishop Usher's scheme; whereupon they proceeded to consider the minor points, such as the alterations of the Liturgy. Baxter, with the consent of his party, drew up a 'Reformed Liturgy' which the Episcopalian commissioners would not look at, considering the wholesale rejection of the older one *ultra vires* on their part. Finally, the parties separating without arriving at any conclusion; and this fruitless attempt at 'comprehension' was followed in 1662 by the famous 'Act of Uniformity,' the result of which was that 2000 clergymen were forced to abandon their livings in the Church of England.

SAVU' ISLANDS lie in the Indian Ocean, to the south-east of the Sandalwood Island. Pop. 35,000. The islands of the group are small, except Savu, in 121° 45′—122° 7′ E. long., and 10° 25′—10° 36′ S. lat., with an area of 237 sq. miles. It is very fertile and healthy, the thermometer ranging from 76° to 88° F., by day, and 68° to 70° by night. The products are those usual in the Indian Archipelago. Horses and excellent tobacco are exported to Timor.

There are several rajahs who are under the Netherlands Resident at Timor, a postholder being stationed at Seba, where there is good anchorage.

The Savunese belong to the Malay race. Their religion is a traditionary heathenism, in which the offering of sacrifices of dogs is frequently practised.

SAW, one of the most important tools used in working timber. It usually consists of a long strip of thin steel, with one edge cut into a continuous series of sharp teeth. Notwithstanding the great simplicity of the principle upon which the saw is made, it admits of great variation, and modern carpentry has brought into use a great many kinds of saws adapted to different purposes. The most common is the *Hand-saw* (fig. 1), in general use. For this the blade is broader at one end than the other, and a wooden handle is fixed to the broader end, without which it could not be used. This kind of saw is varied by the manner in which the teeth are cut and set, and in the shape and width of the blade, as in *Compass* or *Key Saws* for cutting small holes (fig. 2). Other kinds of hand-saws, such as the *Back saw* (fig. 3) and the *Tenon-saw* (fig. 4), have straight blades, and the back is guarded and



strengthened by a piece of brass or iron bent over it. The *Bow-saw* (fig. 5) is used for a variety of purposes; the blade, which is always thin, is stretched like a bowstring to an iron frame. The *Frame-saw* (fig. 6), chiefly used in sawpits and mills for cutting timber longitudinally, is similar in shape to the ordinary hand-saw, but much larger, with holes at each end, for fixing it in the frame by which it is moved up and down. For cutting timber transversely, the *Cross cut-saw* (fig. 7) is used; this differs not only in shape, but in the set of the teeth

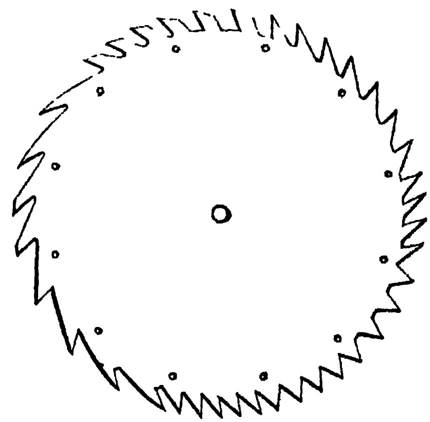


Fig. 8.—Circular-saw.

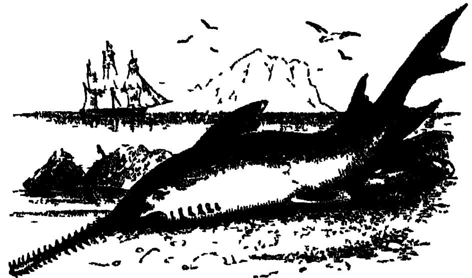
from other saws. Within the present century, the *Circular-saw* (fig. 8) has come into universal use wherever machinery can be had for working it. It

is generally so fitted as to be worked under a flat bench, a part only of the blade projecting through a narrow slit cut in the top of the bench. It is made to revolve with great rapidity, and the wood resting on the bench is pushed against the saw in the direction it is intended to be cut. The rapidity with which wood is cut by the circular-saw is truly marvellous. To save space, several forms of teeth are shewn in the figure, but each saw has but one kind. The *Ribbon-saw* is comparatively a new invention. It consists of a very long band—or web, as it is called—of steel, usually very narrow, and with finely-cut teeth. The two ends are joined together so as to form an endless band, which is passed over two revolving drums, one above, and the other below the working-bench, through holes in which the saw passes. With this work, the finest patterns in open work may be cut out with great ease and rapidity. Numerous other kinds of saws are in use, but these are the chief.

SAWDUST. The waste made by sawing timber, formerly of little or no use, has now become a material of some value in localities where it can be applied. Its most interesting application is one very recently patented by Messrs Dale & Co. of Manchester, whereby it is converted into oxalic acid, and with so much success as to have nearly or altogether displaced every other method of making that chemical. The process is very simple. The sawdust is first saturated with a concentrated solution of soda and potash in the proportion of two of the former to one of the latter; it is then placed in shallow iron pans, under which flues run from a furnace, whereby the iron pans are made hot, and the saturated sawdust runs into a semi-fluid, pasty state. It is stirred about actively with rakes, so as to bring it all in contact with the heated surface of the iron, and to granulate it for the succeeding operations. It is next placed in similar pans, only slightly heated, by which it is dried. In this state it is oxalate of soda mixed with potash. It is then placed on the bed of a filter, and a solution of soda is allowed to percolate through it, which carries with it all the potash, leaving it tolerably pure oxalate of soda. It is then transferred to a tank, in which it is mingled with a thin milk of lime, by which it is decomposed, the lime combining with the acid to form oxalate of lime, and the soda being set free. Lastly, the oxalate of lime is put into a leaden cistern, and sulphuric acid is poured in; this takes up the lime, and sets free the oxalic acid, which readily crystallises on the sides of the leaden cistern, or on pieces of wood placed on purpose. So rapid and cheap is this method, compared with that formerly in use, that several extensive old manufactories have been shut up since the article on OXALIC ACID was written, being unable to compete with the patent process.

Another interesting use of the sawdust of hard woods, such as rosewood, ebony, &c., is that recently made known in France under the name of *Bois-durci*. The various kinds of sawdust used are reduced to fine powder, and mixed with blood into a paste; other materials are doubtless added, for when pressed into moulds it is jet black, and receives the most beautiful impressions. Messrs Latry, Senior, & Co. of Paris produce some very beautiful medallions and other small articles in this material.

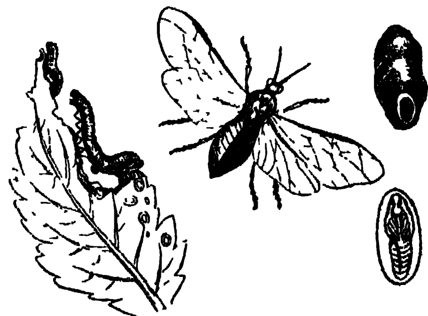
SAWFISH (*Pristis*), a genus of cartilaginous fishes, constituting the family *Pristidæ*, which is ranked with the Rays (q. v.), although the elongated form of the body agrees rather with that of the sharks. In a number of anatomical characters, however, the sawfishes differ from sharks, and agree with rays, and conspicuously in the position of the gill-openings, which are not on the sides, as in sharks, but on the under-surface, as in rays. The mouth is on the under surface of the head, and is furnished with pavement-like teeth, adapted for crushing. But the S. is particularly remarkable for the elongation of the snout into a flat bony sword, armed on each edge with about twenty large bony spines or teeth; a most formidable weapon, of



Sawfish (*Pristis antiquorum*).

which it seems to make use for killing prey, rushing amongst shoals of fishes, and slaying them right and left. Whales are said to be sometimes killed by sawfishes, and the saw has been sometimes driven into the hull of a ship. There are six or seven known species of S., and they are distributed over the whole world. The COMMON S. (*P. antiquorum*) was known to the ancients, being found in the Mediterranean. It is a very widely distributed fish, being found both in polar and tropical seas. It sometimes attains the length of eighteen feet, including the saw. Sawfishes are seldom seen near the shore, and no species is reckoned among British fishes.

SAWFLY (*Tenthredo*), a Linnæan genus of insects of the order *Hymenoptera*, now divided into many genera, and constituting a family of which the species are very numerous. They derive the name S. from the ovipositor of the females, which is scaly, serrated, pointed, and enclosed in a sheath of two concave plates. By means of this instrument, the female S. perforates the stalks or other parts of plants, laying an egg in each hole. The hole soon becomes filled with a frothy liquid, and sometimes a gall-like swelling is formed, within which the larva resides. The larvæ of many sawflies, however, live



Turnip Sawfly (*Athalia spinarum*), in its various stages of Transformation.

in no such nests, but feed on foliage, like caterpillars, which they very much resemble. One of the most common species of gooseberry 'caterpillar' is the larva of a S. (*Nematus ribesii*). Sawflies have the abdomen cylindrical, and so united to the thorax that the distinction is not easily perceived. They

vary much in the antennæ. Both pairs of wings are divided by nervures into numerous cells. Among the more notable species is the CORN S. (*Cephus pygmæus*), which, in its perfect state, abounds on umbelliferous flowers, a shining black insect, marked with yellow, the abdomen elongated. The larva consumes the inside of the straw of corn, and descending to the base of the straw, cuts it down level with the ground.—Another important species is the TURNIP S. (*Athalia spinarum*), reddish, spotted with black; the larva nearly black, and known by the names of *Black Jack* and *Nigger*. The Turnip S. is sometimes very troublesome and destructive for a year or two, and then almost completely disappears for a number of years. It has sometimes been very destructive to the turnip-crops of Britain.—The S. of the Pine (*Lophyrus pini*) is a common British species, and sometimes, although not very often, strips pine and fir trees of their leaves.

SAW-MILL. Within the present century, the art of working saws by machinery has been invented, and large mills for cutting up timber by means of large saws worked by machinery, are to be found in most civilised countries. They are worked both by steam and water-power, and in Holland, wind mills are made to work sawing machinery. The arrangements of a saw-mill are very simple: they consist of a fixed horizontal frame, with rollers at short intervals, upon which the tree or log of timber is laid; at the end of this, another frame is placed in a vertical position; it contains as many saws placed side by side as it is proposed to cut planks out of the log, and they are set as far apart as the desired thickness of the planks or boards. A rapid up-and-down motion is given to these saws by the machinery, and at the same time the log is pulled forward on the rollers by the same power, so as to be kept constantly up to the saws. In this way, a large tree or log of wood may be cut into twenty planks in much less time than was formerly required by laborious hand-labour to cut one single thickness.

The circular-saw is also much used in mills for cutting planks and boards into pieces of almost any form.

SAXE, HERMANN MAURICE, COUNT OF, one of the greatest warriors of the 18th c., was the natural son of Augustus II. (q. v.), Elector of Saxony and king of Poland, and the Countess Aurora von Königsmark, and was born at Goslar, 28th October 1696. When only twelve years of age, he ran off from home, made his way to Flanders, joined the army of Marlborough, and took part in the capture of Lille and the siege of Tournay. With a boyish love of change, he joined the Russo-Polish army before Stralsund (1711), and after the taking of Riga, returned to Dresden, where his mother induced him, in 1714, to espouse a young and amiable German heiress. In the two following years, he took part in the civil war then raging in Poland; but having quarrelled with his father's favourite minister, he returned to Dresden, where the well-grounded jealousy of his wife made his life sufficiently disagreeable. Obtaining the annulment of his marriage, and a pension from his father, he came to Paris in 1720, where he devoted himself for some years to the study of military tactics, and originated and developed an entirely novel system of manœuvres, which was highly spoken of by the Chevalier Folard, the celebrated military engineer. In 1726, he was elected Duke of Courland, and for a time maintained himself in his new possession against both Russians and Poles, but was compelled to retire to France in the following year. Joining the army on the Rhine, under the Duke of Berwick, he signalised himself at the siege of Philipsburg (1734), and decided the battle of Ettingen by a desperate charge at the head of a division of grenadiers. For these services, he was made a lieutenant-general in 1736; and on the breaking out of the war of the Austrian Succession, he obtained the command of the left wing of the army which was appointed to invade Bohemia, and took the strongly-fortified town of Prague by storm with marvellous celerity. The capture of Egra was similarly effected a few days afterwards, and the rest of the campaign shewed that his abilities in the field were not inferior to his skill against fortifications. In 1744, he was made a marshal of France, and appointed to command the French army in Flanders, and on this occasion he gave decisive proofs of the soundness and superiority of his new system of tactics, by reducing to inaction an enemy much superior in number, and taking from him, almost before his face, various important fortresses. The following year was for him more glorious still; his army was reinforced, and though so ill with dropsy that he had to submit to tapping (15th April), he laid siege to Tournay on the 22d, and on the advance of the Duke of Cumberland to its relief, took up a position at Fontenoy, and awaited attack. He was assailed on the 11th May, and the desperate valour of the English for a time bore down everything before them; but S. sped about in his litter, encouraging his troops, and when the critical moment came, the fire of his artillery disorganised the English, and a charge of the French completed the victory. Four months afterwards, every one of the numerous strong fortresses of Belgium was in his hands. In 1746, S., by a series of able manœuvres, threw back the allies on the right bank of the Maese, and gained (11th October) the brilliant victory of Raucoux, for which he was rewarded with the title of marshal-general, an honour which only Turenne had previously obtained. For the third time, at Laufeldt (2d July 1747), the victor of Culloden suffered complete defeat at the hands of S., whose favourite system of tactics was again brought into full play; and the brilliant capture of Bergen-op-zoom brought the allies to think of peace. The Dutch, however, were still disposed to hold out, till the capture of Maestricht (1748) destroyed their hopes, and the peace of Aix-la-Chapelle followed. S. had previously carried on a correspondence with the great Frederick of Prussia, and he now took occasion to visit him at Berlin, experiencing the most brilliant reception. In the following year, Frederick wrote to Voltaire: 'I have seen the hero of France, the Turenne of Louis XV.'s time. I have received much instruction from his discourse on the art of war. This general could teach all the generals in Europe.' S. lived at his estate of Chambord for some time afterwards, and died there of dropsy, 30th November 1750. His work on the art of war, entitled *Mes Rêveries*, was published at Paris in 1757.

S. was probably the greatest captain of his time, and a gallant and enterprising leader, but he was a mere soldier, and the offer of membership made to him by the Académie Française is sufficiently ridiculous. S. had, however, the good sense to decline the proffered honour, and he did so in a sentence, the extraordinary orthography of which accidentally rebuked, more than the most cutting sarcasm could have done, the mean sycophancy of the Académie. He wrote: 'Ils veule me fere de la cademie; sela m'iret come une bage a un chas.'

Many biographies of S. have been written, but few of them are to be much depended upon.—See *Moritz von Sachsen* (Dresden, 1863), by Karl von

Weber; and the *Nouvelle Biographie Générale* (art. 'Saxe'). His character and genius are also well, though not flatteringly, portrayed in Carlyle's *Life of Frederick the Great.*

SAXE-A'LTENBURG, the smallest of the minor Saxon states, is a duchy bounded by Saxe-Weimar, Prussian Saxony, the kingdom of Saxony, Saxe-Meiningen, and Schwarzburg-Rudolstadt, and separated into two nearly equal parts by the interposed principality of Reuss-Gera. The eastern portion, or *circle of Altenburg*, from its being watered by the Pleisse, was formerly called *Pleissengau*. It contains 241 English sq. m., with a pop. (1863) of 91,375. The western part, or *circle of Saal-Eisenberg*, is watered by the Saale, with the Orla and Rode, and contains 262 English sq. m., with a pop. (1863) of only 47,687. Total area, 503 sq. m., with a pop. of 139,062, one-third of whom are inhabitants of towns. The vast bulk of the population are Protestants, there being in 1858 only 800 Catholics and 1400 Jews, almost none of the latter settled in the country. The eastern portion is open, undulating, and very fertile, and agriculture has here attained considerable perfection, and is diligently pursued by a large proportion of the population, so that much more corn is produced than is necessary for home-consumption. The peasants in this circle, though speaking the Thuringian dialect, exhibit in their dress, manners, and customs a family resemblance to the Wendish-speaking Serbs of Lusatia; and numerous names of places, especially those ending in *itz*, indicate their Slavic origin. They are celebrated throughout Germany for their skill as agriculturists, and their superior intelligence, knowledge, and comparative wealth. The revenue amounted in 1863—1864 to £46,190; and the expenditure, including the duke's civil list, to the same sum. The military force consists of 1473 men, who form two battalions of the federal army. S. is a limited monarchy, in accordance with the constitution of 29th April 1831, modified somewhat by the events of 1848—1849. The assembly of deputies, consists of 24 members, 8 representing the landed proprietors, 8 from the towns, and 8 from the country. The government is in the hands of a ministry of three. Altenburg (q. v.) is the seat of government.

SAXE-CO'BURG-GO'THA, the third in point of size and population of the minor Saxon states, is a duchy comprising the *duchy of Gotha*, lying between Prussia, Schwarzburg, Hesse-Cassel, Meiningen, and Weimar, and containing 542 English sq. m. (inclusive of *Nazza*, an isolated portion on the north-west, 14 English sq. m., and *Volkenrode*, on the north-east, within Prussia, 25 English sq. m.), with a pop. (1861) of 108,301; and the principality of *Coburg*, 18 miles south of Gotha, lying between Meiningen and Bavaria, and containing 210 English sq. m. (inclusive of *Königsberg*, in Bavaria, 19 English sq. m.), with a pop. (1861) of 47,014. Total area, 752 English sq. m.; pop. 155,315. Gotha lies on the north side of the Thuringer-wald, which extends along and within its southern frontier; but the rest of this duchy consists of low, undulating, and very fertile land, and is watered by the Werra, an affluent of the Weser, the Unstrut, a tributary of the Saale, and several smaller streams. Coburg lies on the southern slope of the same range, is watered by the Itz and Rodach, affluents of the Main, and has extensive forests, and many beautiful valleys between the spurs of the Thuringer-wald. Of the surface of the whole duchy, $\frac{5}{9}$ths is arable, $\frac{2}{9}$ths is wood, $\frac{1}{12}$th waste land, and the rest pasture and gardens. In the plains and valleys, the climate is mild and salubrious, but in the mountainous parts of Gotha it assumes a more inclement character. Agriculture is the principal occupation of the people, and is pursued with energy and skill; corn and flax being produced in abundance, as also potatoes, and various leguminous plants. The breeding of horses, cattle, and sheep is also successfully conducted. The mineral wealth includes coal (chiefly in Gotha), iron, cobalt, manganese; also marble, porcelain-earth, millstones, and salt. The manufactures are not of much importance, and are chiefly confined to Gotha. There is a large beet-sugar factory at Gotha. The extensive forests of the duchy employ a large proportion of the population in the production of pitch, tar, and potash. The duchy is a limited monarchy, in accordance with the fundamental law of 3d May 1852. Coburg and Gotha have each a *landtag*, or diet; that of the former consisting of 11, and of the latter of 19 deputies; besides which there is a common landtag for the whole state, composed of 7 of the Coburg, and 14 of the Gotha representatives, who are elected by their several diets. The mode of election to the separate diets is peculiar, being effected by electors equal in number to the members to be chosen, each elector being appointed for that purpose by a separate district. The diet endures for 4 years, and must never be prorogued for more than 6 months. There are two ministers for carrying on the government, one for Coburg, and another for Gotha. The duke has a vote in the plenum, and shares the 12th vote in the little council of the German diet. The military contingent consists of 1302 men, a reserve of 372, and the same number of substitutes, making in all 2046 men, who form one regiment of two battalions in the federal army, and are, by the convention of July 1, 1861, under the authority of, and maintained by, Prussia. Education is well attended to.

The finances of the two portions of the duchy are separately administered, that of Coburg being as follows—receipts (1865), £39,564; expenditure, £39,219; public debt, comprising £29,400 of paper-money, £151,859; and of Gotha, receipts (1865), £89,762, balancing the expenditure; debt, including £59,000 of paper-money, £160,682. The revenue (1865) of the ducal domains is £99,136, and the expenditure £25,090. The present ducal family is distinguished among the German princely families for the spirited and liberal character of its members, as well as for physical and mental gifts. It is allied with several of the royal families of Europe, the present duke's younger brother having been the late Prince Albert of Great Britain; one of his cousins, the husband of Queen Maria II. of Portugal; and his uncle, Leopold, king of the Belgians. The heir-apparent to the duchy is Alfred, the second son of Queen Victoria of Great Britain.

SAXE-MEI'NINGEN, the second in size and population of the minor Saxon states, is a duchy, consisting of one large crescent-shaped territory, which lies immediately north of Bavaria and Coburg, with the horns of the crescent pointing northwards, and contains 862 English sq. m., with a pop. (1861) of 159,868, and two small isolated territories, Kranichfeld (28 English sq. m., pop. 3144)—consisting of four detached portions, on the north, between Weimar and Schwarzburg-Rudolstadt—and Kamburg (53 English sq. m., pop. 9329), on the north-east, between Weimar and Prussia; total, 943 English sq. m.; pop. (1861) 172,341, of whom 169,870 are Protestants, 842 Catholics, 82 Mennonites, and 1547 Jews. The crescent is composed of the old duchy of Meiningen, the old duchy of Hildburghausen, and the principality of Saalfeld (both of which, along with Kamburg, were annexed to Meiningen in 1826). S.

forms the south-west of Thuringia (q. v.), and is traversed in the east and north by the Thuringer-wald, offshoots from which also cover the west, while the Rhön-gebirge enters the country at the south-west. Its surface is thus necessarily hilly, in some places even mountainous, Kieferle in the Thuringer-wald being 2700 feet, and Geha-berg in the Rhön-gebirge, 2308 feet above sea-level; but between the mountain ridges are numerous fruitful valleys, and that of the Werra in particular is one of the most fertile and picturesque in Germany. The Werra, Saale, Milz, Steinach, Itz, &c., water the country. Two-fifths of the country is arable land; a nearly equal extent is under wood; and the rest is meadow, garden and vineyard, and waste. In the lower lands, agriculture is in an advanced condition, and is prosecuted with such vigour, that corn enough is produced for home-consumption; potatoes, hemp, flax, and tobacco are the other chief crops.

The mining industry of the east and north is important, employing in 1852 no less than 3820 men; and the important mineral products are iron, copper, cobalt, coal, porcelain-clay, sulphur, and salt from the works of Salzungen, Neusulza, and Friedrichshall. S. is also an active manufacturing district, chiefly in woollen, cotton, and linen fabrics, and paper; and brewing, distilling, the making of glass and porcelain, and various other branches of industry, are prosecuted. The fabrication of wooden toys in the district around Sonneburg employs 8000 men, and the produce is bought up by the Sonneburg dealers for export. A rape-sugar-factory is maintained. S. is a limited monarchy in accordance with the fundamental law of 1829, and the election act of 25th June 1853. The diet consists of 24 representatives 2 from the nobles, 6 from the landowners, 8 from the towns, and 8 from the country. The government is carried on by five ministers, each of whom heads a separate department. The duke has a voice in the plenum, and shares the twelfth vote in the small council of the Germanic Confederation. The army consists of 2110 men, and 384 substitutes, and forms a regiment of two battalions in the federal army. The annual budget (1862—1865) is as follows: Revenue of domains, £67,584, and from taxes, &c., £91,271; total revenue, £158,858; expenditure, [illegible]; public debt, £307,573. The present duke, Bernhard-Erich-Freund, who has reigned for 62 years, spontaneously gave his subjects a liberal representative constitution in 1824. S. is distinguished as the best governed state in Germany.

SAXE-WEI'MAR-EI'SENACH, the largest of the minor Saxon states, is a grand duchy, consisting of *Weimar*, which lies between Prussia, Altenburg, and Schwarzburg-Rudolstadt, and contains (inclusive of Allstädt, on the Unstrut, within Prussia, 45 English sq. m., and Ilmenau, in the south-east of Gotha, 32 English sq. m.) 685 English sq. m., with a pop. (1861) of 140,772; *Eisenach*, the western portion, which lies to the north of Meiningen and Bavaria, and contains (inclusive of Ostheim, in the Rhön-gebirge, in Bavaria, 23 English sq. m.) 461 English sq. m., with a pop. (1861) of 82,444; and *Neustadt*, which lies on the western boundary of the kingdom of Saxony, and contains 239 English sq. m., with a pop. (1861) of 50,036; total area, 1385 English sq. m.; pop. 273,252, of whom 262,272 are Protestants, 9824 Roman Catholics, 57 Greek Catholics, 1088 Jews; the Jews and Catholics being chiefly in Eisenach. The Eisenach portion is traversed in the north by the Thuringer-wald, and in the south by the Rhön-gebirge, the intermediate districts being also hilly and undulating, and watered by the Werra and its feeders, the Fulda, Ulster, Suhl, and Orsel. The Neustadt division is traversed from south-east to north-west by several offshoots of the Erz-gebirge, but most of the surface belongs to the plain of the Saale, and is watered by the Elster and Orla, affluents of that river. The Weimar portion is also partly hilly and uneven, and partly belongs to the plain of the Saale, which, with its tributary, the Ilm, traverses it. The highest peak in the grand duchy is Hinkelhahn (2694 feet), in the detached territory of Ilmenau. The climate is somewhat inclement in the high lands, more temperate in the plains, and particularly pleasant along the valley of the Saale. Of the whole surface, about [illegible]ths is arable, [illegible]ths is forest, and the rest is meadow-land, gardens, and vineyards. Agriculture is in an advanced condition, and is diligently prosecuted, there being frequently a surplus of grain over and above that required for home-consumption, in spite of the occasional infertility of the soil; and potatoes, pulse, hemp, flax, hops, and (on the banks of the Saale) vines are also cultivated. Horse and cattle breeding is a common pursuit in Neustadt and Eisenach, and sheep-breeding in Weimar, the sheep having the usual good reputation of the Saxon breed. The mineral wealth comprises coal, iron, copper, cobalt, and marble. Eisenach is the chief seat of the manufacturing industry, with the exception of the woollen manufactures, which are principally carried on in Neustadt. The form of government is, according to the revised fundamental law of 15th October 1850, a limited monarchy; the diet, or landtag, is composed of 31 deputies, 1 representing the landed nobility, 4 chosen by landed proprietors, with incomes under [illegible] thalers, 5 by those who possess the same income from other sources, and 21 by universal suffrage. The government is administered by four heads of departments. The grand duke has one vote in the plenum, and shares the twelfth vote in the little council of the German diet with the rulers of Saxe-Meiningen, Saxe-Coburg Gotha, and Saxe-Altenburg. The military contingent is 2345 men, which, with 670 of reserve, amounts to 3015 men, who form 3 battalions of the federal army. The annual revenue is estimated (for 1863—1865) as follows: Receipts, £216,144; expenditure, £245,534; public debt, £667,795. The Grand Duke of Weimar is the chief of the Ernestine branch of the House of Saxony. The most celebrated of the Weimar family was Duke Karl-August, the Mæcenas of the art, literature, and science of Germany, who took the reins of government in 1775, and displayed extreme anxiety to favour the development of public prosperity and the progress of education. Under his fostering care, the university of Jena became a focus of intellect and knowledge to Germany; and the presence of Herder, Goethe, Schiller, and others at his court, well entitled it to be denominated the abode of the Muses. He also elevated the theatre of Weimar to its present position as the chief German school of dramatic art. In 1806, he joined the Confederation of the Rhine with the title of duke, and received from the Congress of Vienna an accession of territory, and the title of grand duke. In 1816, he granted a liberal representative constitution to his subjects, expressly guaranteeing the liberty of the press, and died 14th June 1828. His successors have followed in his footsteps.

SA'XIFRAGE (*Saxifraga*), a genus of plants of the natural order *Saxifrageæ*, or *Saxifragaceæ*. This order has a calyx, usually of five sepals more or less cohering at the base; a corolla usually of five perigynous petals, alternate with the sepals, rarely wanting; perigynous stamens; a hypogynous or

perigynous disc; an ovary, usually of two carpels, cohering more or less by their face, but diverging at the apex; fruit generally a 1—2-celled capsule, the

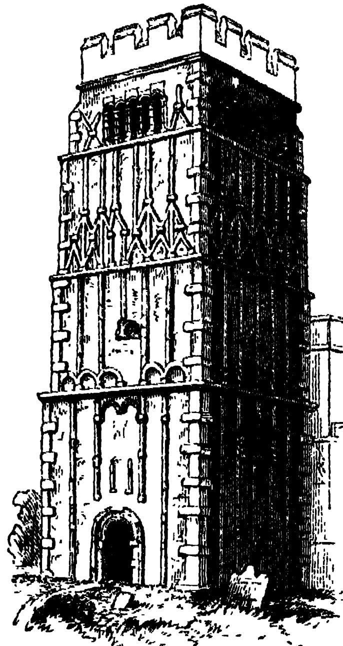


Saxifrage (*S. stellaris*).

cells opening at the ventral suture, and often divaricating when ripe; the seeds usually minute and numerous. The order *Saxifrageæ* is sometimes regarded as including above 900 species, divided into several suborders, which are elevated by some botanists into distinct orders—leaving, however, more than 300 species to the reduced order SAXIFRAGEÆ, which contains herbaceous plants, often growing in patches, with entire or divided alternate exstipulate leaves, natives chiefly of mountainous tracts in the northern hemisphere, and often found up to the limits of perpetual snow, some of them forming there a rich and beautiful turf, and adorning it with their very pleasing flowers. A considerable number are natives of Britain. Some of the genus *Saxifraga* are well known in gardens, and are employed to cover rock-works, &c. *S. umbrosa*, London Pride, or None-so-pretty, is familiar in all cottage gardens. It is a native of the hills of Spain, and of the south and west of Ireland.

SAXO-GRAMMATICUS (i. e., Saxo the 'Grammarian' or 'Scholar'), the most celebrated of the early Danish chroniclers, flourished in the 12th c., and was secretary to Archbishop Absalom. He is said to have died at Koeskilde in 1204. S. undoubtedly formed his style on that of the later Roman historians, particularly Valerius Maximus, yet in his whole mode of representation, he belongs to the school of medieval chroniclers, although ranking first in that school. Erasmus half wondered at his elegance. Moreover, it adds mightily to our respect for S., that although a cleric, he did not in the very least degree allow himself to be swayed in his historical conceptions by the prejudices incident to his profession. His work is entitled *Historia Danica*, and consists of 16 books. The earlier portions are of course not very critical, but in regard to times near his own, S. is a most invaluable authority. According to his own statement, he derived his knowledge of the remoter period of Danish history—the 'Heroic Age' of the North—from old songs, Runic inscriptions, and the historical notices and traditions of the Icelanders; but he is not sharply critical in his treatment of the Danish sagas, although a rudimentary critical tendency is occasionally visible. The best edition of the *Historia Danica* is that undertaken by P. E. Müller, and finished by J. M. Velschov (Copen. 1839). It is furnished with a complete critical apparatus. There are good translations from the original Latin into Danish.

SAXON ARCHITECTURE, the style of building used in England before the introduction of the Norman architecture at the Conquest. There are few specimens remaining which can be depended upon as genuine. The Saxons built chiefly in wood, and all their wooden edifices are now lost. It seems probable that a rude and simple style, not unlike Early Norman, was that used by the Saxons. There



Tower of Earl's Barton, Northamptonshire.
(From Parker's *Glossary of Architecture*.)

are several buildings in England which Mr Rickman considers entitled to rank as Saxon. Amongst these, the Tower of Earl's Barton, Northamptonshire, is one of the best examples. The peculiar 'long and short' work of the quoins, the projecting fillets running up the face of the walls, and interlacing like wood-work, and the baluster-like shafts between the openings of the upper windows, are all characteristic of the style.

SAXON LAND. See TRANSYLVANIA.

SAXON STATES, MINOR. The capitulation of Wittenberg, which followed the rout of Muhlberg (see SAXONY), and deprived John Frederick the Magnanimous of the electorate of Saxony, at the same time despoiled him of a large portion of the hereditary possessions of the Ernestine branch. The remainder, amounting—after the acquisition of Coburg, Altenburg, Eisenberg, &c., in 1554—to little more than one-fifth of the whole Saxon territory, was divided into two portions, *Saxe-Gotha* and *Saxe-Weimar*, the former falling to John Frederick II., and the latter to John William, the two sons of the deposed elector. Each of these portions was afterwards subdivided, the former into *Saxe-Coburg* and *Saxe-Eisenach*, and the latter (1573) into *Saxe-Weimar* and *Saxe-Altenburg*. It would only bewilder the reader to attempt to follow the endless subdivisions and reunions that followed. Suffice it

to say, that the gradual adoption of the law of primogeniture during the 18th c., and the extinction of various cadet branches, has left the four states of Saxe-Altenburg, Saxe-Coburg-Gotha, Saxe-Meiningen, and Saxe-Weimar-Eisenach, as described under their several names. Should the Albertine or Saxon-royal line become extinct, the Duke of Weimar succeeds to the throne; and failing his family, the lines of Saxe-Meiningen, Saxe-Altenburg, and Saxe-Coburg-Gotha obtain in this order the right of succession.

SAXON SWITZERLAND. See SAXONY.

SAXONS (Lat. *Saxŏnes*, Ger. *Sachsen*), a German people, whose name is usually derived from an old German word *sahs*, meaning a 'knife,' are first mentioned by Ptolemy, who makes them inhabit a district south of the Cimbrian Peninsula. Towards the end of the 3d c., a 'Saxon League' or 'Confederation' makes its appearance in North-western Germany, to which belonged, besides S. proper, the Cherusci, the Angrivarii, and the largest part of the Chauci. In the times of the emperors Julian and Valentinian, S. and Franks invaded the Roman territory; but their piratical descents on the coasts of Britain and Gaul are far more famous. At what period these commenced, it is impossible to tell but it is believed to have been much earlier than is commonly supposed. Recent investigations seem to prove that S. had established themselves in England long before the time of the mythical Hengist and Horsa (see ANGLO-SAXONS); and we know that as early as 287 A.D., Carausius, a Belgic admiral in the Roman service, made himself 'Augustus' in Britain by their help. They had firmly rooted themselves, at the beginning of the 5th c., in the present Normandy, where a tract of land was named after them, the *Limes Saxonicus*. They fought against Attila (q. v.) in the Catalaunian Plain, 451 A.D. They also obtained a footing at the mouth of the Loire; but all the S. who settled in France 'disappeared' before the Franks, i. e., were probably incorporated with their more powerful kinsmen of Southern Germany. At home, the S. (called *Alt Sachsen*, or 'Old Saxons,' to distinguish them from the emigrant hordes who found their way to England and France) enlarged, by conquest, their territory north and north-west as far as the North Sea, the Yssel, and the Rhine; south, as far as the Sieg, and nearly to the Eder; eastward, to the Weser and Werra, the Southern Harz, the Elbe, and the Lower Saale. Along with the Franks, they destroyed the kingdom of the Thuringians in 531, and obtained possession of the land between the Harz and the Unstrut; but this district was in turn forced to acknowledge the Frankish sovereignty. From 719, wars between the S. and the Franks became constant; but the latter, after 772, were generally successful, in spite of the vigorous resistance offered by Wittekind; and in 804, the S. were finally subjugated by the arms of Charlemagne. Wittekind was the last Saxon king, and the first Saxon duke of the German empire. A collection of the old national laws and usages of the S., under the title of *Lex Saxonum*, was made during the reign of Charlemagne.

During 1830—1840, A. Schmeller published (from two manuscripts, one preserved at Munich, and the other in the British Museum) an 'Old Saxon' poem of the 9th c., called *Hêliand*, i. e., the 'Healer,' or 'Saviour,' which narrates in alliterative verse the 'History of Christ' according to the Gospels, whence it is also called the 'Old Saxon Gospel Harmony.' It is probably a part of a more comprehensive work, embracing a poetical treatment of the history of the Old and New Testament, which Ludvig the Pious intrusted to some celebrated Saxon singer. This unknown poet lived, as his language leads us to conjecture, somewhere between Münster, Essen, and Kleve. His work is not only the almost sole monument of the old Saxon tongue left us, but is also of high poetical value, through its warmth of feeling, and the strength and splendour of its diction—worthy, indeed, to take its place alongside the contemporary Anglo-Saxon and old Norse poetry. —See Vilmar's *Deutsche Alterthümer im Hêliand* (Marb. 1845).

SA'XONY (Ger. *Sachsen*), KINGDOM OF, the second in importance and population of the minor German states, though inferior to four of them in extent, is bounded on the N. and N. E. by Prussia, S.-E. and S. by Austria, and W. by Bavaria, Thuringia (q. v.), and Prussia. It is divided, for administrative purposes, into the following circles:

	English Sq. Miles.	Pop. in 1861.
Dresden,	1651	583,218
Zwickau,	1765	827,245
Leipzig,	1323	506,294
Bautzen or Budissin,	957	308,488
Total,	5696	2,225,240

The kingdom is somewhat of the form of a right-angled triangle, with the right angle in the north-west, and the longer side lying along the foot of the Erz-gebirge range, which sends its spurs northward over the southern half of the country, giving to that portion a somewhat mountainous character, while the northern half remains a flat or undulating plain. The whole country, with the exception of a small portion in the extreme east, which belongs to the Oder basin, and is watered by the Neisse, is drained by the Elbe (which is wholly navigable in S.) and its tributaries the Muglitz, Wilde-Weisseritz, Trubsch, Mulde, and White Elster, on the west; and the Wessnitz, Black Elster, and Spree on the east. From the point where the Elbe bursts through the Erz-gebirge chain to within about 8 miles of Dresden, it traverses a district rich in picturesque scenery, to which the somewhat inappropriate name of *Saxon Switzerland* has been given. This district, which averages about 24 miles long by 23 broad, is an elevated plateau of coarse crumbling sandstone (much resembling the English green-sand); and though destitute of the perpetually snow-clad mountains, glaciers, serrated ridges, and escarped peaks which give a character of lofty grandeur to its namesake, it can boast of features equally peculiar and strikingly romantic. From the soft nature of the rock, it has yielded freely to the action of the mountain rills, which rise from the hills on its east and west borders, and converge to the Elbe, and is cut up in all directions by deep narrow gorges (so symmetrical in their formation as to resemble artificial lanes), the constantly deepening beds of these mountain torrents, which here form cascades, there sullenly glide through deep vales bordered by rocks of the most fantastic forms, or by steep rugged slopes thickly clad with trees. High above the level of the plateau rise towering rocks, some of them pyramidal or conical, others pillar-like, while a few taper almost to a point, and then bulge out at the top; all clearly testifying to the agency by which they have been produced. The medieval knights took advantage of these curious results of nature's so-called freaks, to erect castles upon the summits of some of them; several of these castles still exist, and one of them, Konigstein, is almost the only virgin fortress in Europe. The most remarkable of these peaks are Königstein (864 feet), Lilienstein (1254 feet), the Bastei (600 feet), Nonnenstein, Jungfernsprung, and seven others, each of which possesses its group of traditionary gnomes and

kobolds. The lakes of S. are unimportant, and the only canals are those constructed between the mines and ore-mills.

Climate, Soil, Products, &c.—The climate is healthy, and on the whole temperate, though occasionally severe in the south-western districts. Of the whole surface, more than one-half is arable, nearly one-third is in forest, about one-ninth in meadow, while the rest is occupied by gardens and vineyards, coarse pasture and waste land, or quarries and mines. The arable land has long been in a high state of cultivation, as is the case with the whole of Upper S. (see *History*), yet notwithstanding this, and its extreme fertility, the produce is hardly sufficient to supply the wants of the dense population (390 to the English sq. mile). The agricultural products consist of the usual cereals and leguminous plants, with rape, buck-wheat, hops, flax, and potatoes, and all kinds of fruits suited to the climate. The forests, the largest of which are in the Voigt-land (the south-west corner of Zwickau), and along the northern slopes of the Erz-gebirge, supply timber of excellent quality, and in such abundance as to render them one of the great sources of wealth and industry. The rearing of cattle is an important employment in the mountainous districts of the south-west. Sheep, for which S. was formerly so famous, have been less generally attended to of late years, though, from the introduction of merinos, and increased care in breeding and rearing, the quality of the wool has much improved, and at the present day it occupies a high position in the markets of the world. Minerals are another great source of national wealth, the ore being both rich and abundant, and the processes of excavation and smelting in a high state of perfection. Most of the mines belong to the crown; they are situated in Zwickau and Dresden, and mostly on or near the northern slope of the Erz-gebirge. The mineral wealth includes silver, tin, iron, cobalt, bismuth, zinc, lead, nickel, arsenic, antimony, and other metals, besides coal, marble, porcelain-earth, vitriol, and various gems. In 1857, there were in operation 469 mines, employing 11,599 hands; and the products amounted in value to more than £278,000, five-sixths of the amount being the value of the silver obtained. Salt is not found.

Manufactures, Commerce, &c.—Manufacturing industry has also been greatly developed, and several branches have been carried to a high degree of perfection. This species of labour employs nearly three-fifths of the whole population. The oldest manufacture is that of linen, which at present employs more than 16,000 looms; but it is now eclipsed by the cotton-spinning and weaving, which is the most important branch of Saxon industry, has its chief seats at Chemnitz, Frankenberg, Zschoppau, Folkland, and Lausitz, and uses up annually about 30,000,000 lbs. of raw cotton in 135 spinning-mills, which have 554,646 spindles. Broadcloth, thread, merinos, silks, mixed silk and woollen wares, &c., are also produced in considerable quantity, and of excellent quality; the muslin de laines being still preferred by many to those of England and France, while the laces and embroideries preserve their ancient well-won reputation. Saxon pottery and porcelain have long been famous. The chief centres of manufacturing industry are in Bautzen and in the mountainous country to the north of the Erz-gebirge. Owing to this extension of manufacturing industry, combined with a deficiency in the supply of home-grown articles of consumption, an extensive foreign commerce is rendered necessary, and this is chiefly carried on through the medium of the great fairs of Leipzig (q. v.). The chief imports are corn, wine, salt (not found in S., though common enough in Prussian Saxony), cotton, silk, flax, hemp, wool, coffee, tea, &c. The kingdom forms a part of the Zollverein (q. v.), and consequently, statistics of the state of its commerce are hardly to be obtained. The country is well provided with roads, railways, and lines of telegraph.

Government, Religion, Education, Revenue, &c.—The government is a limited monarchy, hereditary in the Albertine line, and is carried on according to the constitution of September 4, 1831, modified by several changes in 1849, 1851, 1860, and 1861. The legislature consists of two chambers, which meet at the same time, and possess equal powers; the first chamber consisting of the nobles, a representative of the university of Leipzig, one of the Evangelical, and one of the Catholic clergy, and the superior magistrates of the chief towns; the second, of deputies from the inferior landowners from towns, from the country, and from manufacturing and commercial districts. There is also a council of state, to advise regarding the propriety of legislating in any given direction. The king possesses the whole executive power, which is administered through a cabinet of six departments. The established religion is the Lutheran, though the reigning family, since the time of Fr. Augustus I., have been Roman Catholic. Of the population, only 1515 are Reformed, 41,363 Roman Catholics, 1555 Jews, 2415 of other religions, the rest being of the established religion. Education is as much attended to in S. as in Prussia. The annual revenue for the period 1864–1866 amounts to £2,021,530; and the annual expenditure, together with a reserve fund of £14,800, to the same sum. The public debt, four-fifths of which has been created since 1852, amounted at the end of 1863 to £10,021,322. The annual contribution to the expenses of the Germanic Confederation is £5180. The army is raised by conscription, each conscript having the power of sending a substitute in time of peace; the term of service is 8 years, 6 of which are in the active army. The total force, exclusive of the reserve, is 25,396 men, of which 15,748 are infantry, 4005 chasseurs, 3208 cavalry, 2420 artillery with pioneers and sappers, and 60 of the general staff, superior officers, &c. The contingent of S. to the army of the Confederation is 17,344 infantry, 2750 cavalry, 1686 artillery, and 220 pioneers and engineers, forming the 1st division of the 9th army corps. S. occupies the 4th place in the Confederation, and possesses 4 votes in the plenum, and one in the minor council.

History of the Great Duchy of Lower Saxony, and of the Ascanian Electorate of Upper Saxony.—After the final conquest of the Saxons by Charlemagne, they became one of the components of the German empire; but their country by no means corresponded to what is now known as Saxony. It included the most of the country between the Elbe, the Harz Mountains, the Rhine, and Friesland; and, in 850, was erected into a dukedom, with Lubeck for its capital, and ruled by hereditary princes. Ludolf, the first duke, is said to have been the great-grandson of Wittekind, but nothing is certainly known of his ancestry. His second son, Otho the Illustrious (880–912), was the most distinguished of the German princes; he fought valiantly against the Normans, and, on the extinction of the Carlovingian dynasty (911), refused the crown of Germany which was unanimously offered him by the electors. His son Duke Henry (912–936), surnamed 'the Fowler,' obtained the throne (919), and commenced the Saxon line of German sovereigns, which was continued by Otho I. (q. v.), Otho II. (q. v.), Otho III. (q. v.), and Henry II., and ended in 1024. Otho I., handed over the great duchy of S. to Hermann

Billung in 960, on condition of military service; and this family held it till 1106. Under the Billung dynasty, the prosperity of the country greatly increased, and Meissen, Thuringia, East S., in Lusatia, S. in the Northern Mark, Anhalt, Saltzwedel, and Slesvig, were all dependent on the Saxon duke. A portion of S. had, however, been reserved by the emperor, Otho I., for his nephew Bruno, who founded a lordship of Saxony-Brunswick; and, in the middle of the 11th c., a duchy of 'Saxony on the Weser' was also founded; but both of these (united by marriage in 1090 or 1096) came (1113) by marriage to Count Lothar of Supplinburg, who was also invested (1106) with the great duchy of S., which was now more extensive than ever, stretching from the Unstrut, in Gotha, to the Eider, and from the Rhine to Pomerania. After Lothar's accession to the imperial throne in 1125, he handed over (1127) the duchy to his son-in-law, Henry the Proud, the Guelphic Duke of Bavaria, who was thus the ruler of more than half of Germany; but this overgrown dominion did not long exist, for under his son, Henry the Lion (q. v.), it was wrested (1180) from the House of Guelph, Bavaria being given to the House of Wittelsbach; East Saxony created an electorate, and given to Bernhard of Ascania; Brunswick and Luneburg mostly restored to Henry's son; while the numerous and powerful bishops of Northern Germany divided among themselves Westphalia, Oldenburg, and many portions of Luneburg and Brunswick; Mecklenburg and Holstein became independent, and the Saxon palatinate in Thuringia went to the Landgraf Ludwig. S., now shorn of its former greatness, consisted chiefly of what is now Prussian S., a few districts separated from Brandenburg, and Saxe-Lauenburg, the last being the only portion of the great duchy of S., or *Lower Saxony*, as it is called, which retained the name. Wittenberg was the capital of the new duchy. S. was diminished in 1211 by the separation of Anhalt as a separate principality; and in 1260, it was permanently divided into two portions, *Saxe-Lauenburg* and *Saxe-Wittenberg*, to the latter of which the electoral dignity remained, and to which, on subsequent dispute between the two branches, it was confirmed by the celebrated Golden Bull (1356). The Ascanian line became extinct in 1422 with Duke Albert III., and the duchy then passed to Frederick the Warlike, Markgraf of Misnia, and Landgraf of Thuringia, who was invested with it by the Emperor Sigismund in 1423. His possessions consisted of Thuringia, the present kingdom of S., Prussian S., in fact, the whole of *Upper Saxony*, with the exception of Anhalt.

History of the Country now known as Saxony.—The earliest inhabitants of Upper S., since the Christian era, were the Hermunduri (see THURINGIA); and on the destruction of the great Thuringian kingdom in the beginning of the 6th c., their settlements were taken possession of by the Sorbs, a Slavic race, who practised agriculture and cattle-breeding. The Carlovingian rulers, dissatisfied with the ingress of those non-German tribes, erected 'marks' to bar their progress; and Duke Otho the Illustrious of S., and his celebrated son, Henry the Fowler, warred against them, the latter—subduing the Heveller, the Daleminzer, and the Miltzer—founded in their country the marks of Brandenburg (q. v.), Misnia (Meissen), and Lusatia (Lausitz), and planted colonies of Germans among the Sorbs. In 1090, the mark was bestowed on the House of Wettin (a supposed off-shoot of the race of Wittekind), and was confirmed as a hereditary possession to that family in 1127; and the markgraf, Henry the Illustrious (1221—1288), whose mother was heiress to the landgrafdom of Thuringia, with its appendages, combined the whole into a powerful state. Business, commerce, and mining industry now flourished; great roads for commercial purposes were constructed throughout the country, and the Leipzig fairs were established; and, in spite of much internal discord, and frequent partitions of S., its prosperity increased. At last, FREDERICK THE WARLIKE (1381—1428) succeeded in uniting the severed portions of S., to which were added, by purchase and marriage, various districts in Franconia; and in 1423, the electorate of S. (see above). The Saxon elector was now one of the most powerful princes of Germany; but unfortunately the fatal practice of subdividing the father's territories among his sons still continued, and during the reign of the Elector FREDERICK THE MILD (1428—1464), whose brother William had obtained Thuringia, a civil war broke out, and was carried on for years. ERNEST (1464—1486) and ALBERT (1464—1500), the sons of Frederick, in accordance with the will of their father, reigned conjointly over the hereditary domains of the family (the duchy of S., with the electoral dignity, being reserved always to the eldest) till the death of their uncle (1485), when Ernest obtained Thuringia, and Albert, Meissen, while Osterland was equally divided between them. Ernest, the founder of the *Ernestine*, which was also the *elder* or *electoral line*, was succeeded by his son, FREDERICK THE WISE (1486—1525), who favoured the reformation, and firmly supported and protected Luther against the overwhelming power of the Catholic party, which he was enabled to do, from his personal influence with the Emperors Maximilian and Charles V. His brother and successor, JOHN THE CONSTANT (1525—1532), was still more a partisan of the new doctrines, as was also his son and successor, JOHN FREDERICK THE MAGNANIMOUS (1532—1547), but the latter, by the defeat of Muhlberg (q. v.) (see SCHMALKALD), was forced to resign both his electoral dignity and his states. Albert, the founder of the *younger*, *ducal*, or *Albertine line*, was succeeded by his sons, GEORGE THE BEARDED (q. v.) (1500—1539), a rabid Catholic, and HENRY THE PIOUS (1539—1541), a no less zealous Protestant; after whom came the celebrated MAURICE (1541—1547), who was a professed Protestant, but joined the Catholic party against the league of Schmalkald, obliged the Protestant army to retreat from the Danube, and took possession of the estates of the Elector John Frederick, who, however, speedily drove him out, and took possession of ducal S. in his turn. After the rout of the Protestants at Muhlberg, Maurice received the electoral title (1547—1553), and the greater portion of the estates of his vanquished cousin. But the arbitrary political measures and religious severities which were either instituted or promoted by the emperor, induced Maurice to join the Protestants, and by a sudden march on Innspruck, he forced the emperor to agree to the peace of Passau. New tyrannical measures of the emperor caused him to look to an alliance with France, but the scheme was frustrated by his death, July 11, 1553, near Sievershausen, where two days before he had totally defeated the Markgraf Albert of Kulmbach, a secret agent of the emperor's. His brother, AUGUST I. (q. v.) (1553—1586), the first economist of the age, has left a memory dear to S., from the numerous excellent institutions which he established; he considerably increased his territories by purchase and otherwise, and restored Altenburg to the Ernestine line. CHRISTIAN I. (1586—1591), a weak prince, surrendered the reins of government to his chancellor, Crell, who was sacrificed, in the succeeding reign of CHRISTIAN II. (1591—1611), to the revenge of the offended nobility. Christian II. weakly

neglected to assert his claims to Juliers, on the death of its last duke, and allowed it to become a prey to Brandenburg and the palatine House of Neuburg; but his brother, JOHN GEORGE I. (1611—1656), in revenge for this spoliation, allied himself to Austria, and conquered Upper and Lower Lusatia and Silesia. Subsequently, the good understanding between these powers was destroyed, and the elector allied himself with Gustavus Adolphus (1631), and took part in the Thirty Years' War. But on the death of Gustavus, the elector separated from the Swedes, and made a separate peace (1635) with Austria, by which he obtained Upper and Lower Lusatia, acquisitions confirmed by the general treaty of Westphalia (1648). This was the period of the electorate's greatest power. His sons, JOHN GEORGE II. (1656—1680), August, Christian, and Maurice, divided the estates, the three latter founding cadet lines, all of which became extinct before 1750. The reigns of his successors, JOHN GEORGE III. (1680—1691) and JOHN GEORGE IV. (1691—1694), are unimportant, but that of FREDERICK AUGUST I. (q. v.) (1694—1733) well-nigh ruined the hitherto prosperous electorate. Frederick August had been chosen king of Poland; and his attempt, in company with the czar and the king of Denmark, to dismember Sweden, brought down upon him and his two states the vengeance of the northern 'fire-king.' Poland was utterly devastated, and S. exhausted of money and troops. Besides, the king's habits were most extravagant, and to maintain his lavish magnificence, he was forced to sell many important portions of territory. FREDERICK AUGUSTUS II. (q. v.) (1733—1763), also king of Poland, took part in the war of the Austrian Succession (q. v.) against Maria Theresa, but finding the treaty of Berlin (1742) not so satisfactory for himself as he expected, he joined the empress in 1745. The country was atrociously ravaged during the Seven Years' War (q. v.), and a long time elapsed before it recovered its previous peaceful and prosperous state. FREDERICK CHRISTIAN (1763—1763) and FREDERICK AUGUST I. (1763—1827)), laboured zealously for the good of their subjects; and under the reign of the latter, agricultural, manufacturing, and industrial enterprise progressed with rapid strides. In spite of his love for peace, the elector was led into the quarrel respecting the Bavarian Succession (q. v.); but he refused the crown of Poland in 1791, and declined to take part in the convention of Pilnitz, though he joined the Prussian confederation of German princes, and had an army of 22,000 Saxons at the battle of Jena. But the pressure of the French compelled him to join the Confederation of the Rhine in 1806, and from this time his army fought side by side with the French. He obtained the union to S. of the duchy of Warsaw (see POLAND); but fearing that the disasters of the French, in 1812, would be fatal to their supremacy, and to the interests of S., he withdrew to Bavaria, and thence to Prague, renounced the duchy of Warsaw, and made every attempt to come to amicable terms with the allies. But he was again compelled to join the French, between the battle of Lutzen (May 2, 1813) and that of Leipzig (October 16—19, 1813), after which he became the prisoner of the allies, and his army was joined to theirs. For his support of Napoleon, he was deprived of the greater portion of S., which was handed over to Prussia, but he retained the title of king, which had been conferred upon him in 1806. The rest of his reign was occupied with internal reforms. ANTONY (1827—1836) reformed the entire legislation of the country, and granted a liberal constitution, being urged thereto by a popular outbreak in the autumn of 1831. The constitution was proclaimed September 4, 1831, and the state's representatives first assembled, January 27, 1833. FREDERICK AUGUST II. (1836—1854), his nephew, who had been regent for several years, now succeeded, and though favourable to constitutionalism, he was unable to obtain the smooth and harmonious working of the new system. In 1843, violent contests commenced, accompanied by occasional riots in the principal towns, on the subject of the liberty of the press, and the publicity of legal proceedings. Sometimes the constitutionalists, and sometimes their opponents, gained the supremacy, and for a long time, the efforts of the two parties counteracted each other. Towards the close of the king's reign, he was a mere tool in the hands of the reactionary party, headed by his brother JOHN, who succeeded in 1854. King John has, however, supported constitutionalism and religious toleration, and in spite of the resistance of his nobles, who wished to preserve their feudal rights, has established royal courts of justice throughout the kingdom.

SAXONY, PRUSSIAN, the most westerly, undetached province of Prussia, bounded on the E. and N.-E. by the province of Brandenburg. Area, 9673 sq. m.; pop. (1861) 1,976,417. The west districts are occupied by the Harz Mountains, and the peak of the Brocken (3738 feet high) is the chief elevation. The greater portion of the surface, however, is level, and slopes toward the north, in which direction flow the principal rivers—the Elbe, with its tributaries, the Saale and Mulde. The climate is mild and healthy, and the soil is exceedingly fertile and well cultivated. More than the half of the area is under crop, and nearly $\frac{2}{5}$ths are uncultivated, and in water and wood. The *Goldene Aue*, in the south-west, is especially famous for its abundant fertility. Manufacturing industry is most actively carried on, and there are spinning, weaving, and oil-mills in great numbers. The capital is Magdeburg (q. v.). The larger portion of Prussian S. (7911 sq. m.) was detached from the kingdom of Saxony, and ceded to Prussia, by decree of the Congress of Vienna, 1815. See SAXONY.

SAY, JEAN BAPTISTE, an eminent French economist, was born at Lyon, 5th January 1767. Being destined by his father for a commercial career, he passed a part of his youth in England; and on his return to France, obtained a situation in a Life Insurance Company, about which time he made his first acquaintance with the works of Adam Smith. During the Revolution, he was for some time secretary to Clavière, the Minister of Finance; and from 1794 to 1800 edited a journal called *La Décade*, in which he expounded with great effect the views of Smith. Already S. had acquired a distinguished reputation as a thinker by his *Traité d'Economie Politique, ou Simple Exposé de la Manière dont se forment, se distribuent et se consomment les Richesses* (Paris, 1803), and other works. Called to the tribunate in November 1799, he was not slow to express his disapprobation of the arbitrary tendencies of the new consular government, and in 1804 he ceased to be a member of a body that had become a mere tool in the hands of Bonaparte. Under the despotism of the Empire, S. was forced into private life, and betook himself to industrial pursuits, establishing (along with his son) at Auchy a large spinning-mill, which soon employed not less than 500 workmen; and when Bonaparte fell, S. found himself at the head of the economical and commercial movement that marked the epoch. In 1814, the second edition of his now celebrated *Traité* appeared, dedicated to the Emperor Alexander, who had long called himself his 'pupil;' and in the same year the French government sent him to England to study the economical condition of that country. In 1819,

a new chair, that of *Economie Industrielle*, was created for him at the *Conservatoire des Arts et Métiers*; and S. added both to his influence and his popularity by the lucidity, grace, and intensity of conviction displayed in his lectures. In 1831, he was appointed Professor of Political Economy at the *Collège de France*, but died 15th November 1832. Although strictly a follower of Adam Smith, S. is an independent, sagacious, and penetrative thinker. Ricardo speaks of his works as containing 'several accurate, original, and profound discussions.' He was the first to teach Frenchmen to consider rationally such questions as customs-duties, the currency, public credit, the colonies, and taxation; and though the brilliant socialistic theorisers say that he is not an *economiste spiritualiste*, many will consider that defect a merit. Besides his *chef-d'œuvre* already mentioned, S. wrote (among other works) *De l'Angleterre et des Anglais* (Par. 1812), *Catéchisme d'Economie Politique* (Par. 1815), *Lettres à Malthus* (Par. 1820), *Cours Complet d'Economie Politique* (Par. 1828—1830), and *Mélanges et Correspondance* (Par. 1833). His principal writings form vols. 9—12 in Guillaumin's *Collection des Economistes*.

SCAB, in Sheep, like itch in man, or mange in horses or dogs, depends upon the irritation of a minute acarus, which burrows in the skin, especially if dirty and scurfy, causing much itching, roughness, and baldness. The parasite readily adheres to hurdles, trees, or other objects against which the affected sheep happen to rub themselves, and hence is apt to be transferred to the skins of sound sheep. Chief amongst the approved remedies are diluted mercurial ointments, tobacco-water, turpentine and oil, and arsenical solutions, such as are used for sheep-dipping. One of the best and simplest applications consists of a pound each of common salt and coarse tobacco, boiled for half an hour, in about a gallon of water; to this are added two drachms of corrosive sublimate; and the mixture diluted until it measures three gallons. For each sheep, a pint of this mixture should be carefully applied, from a narrow-necked bottle, along the back, and to any other scurfy itchy parts. A second dressing, after an interval of a week, will generally effect a perfect cure.

SCA'BBARD is the sheath for a sword or bayonet, at once to render the weapon harmless and to protect it from damp. It is usually made of black leather, tipped, mouthed, and ringed with metal; but the British cavalry wear scabbards of steel. These better sustain the friction against the horse's accoutrements, but are objectionable from their noisiness, and the consequent impossibility of surprising an enemy. The sword-scabbard is suspended to the belt by two rings; the bayonet-scabbard hooks into a frog in connection with the waist-belt.

SCABE'LLUM, a kind of pedestal to support busts.

SCA'BIES. See ITCH.

SCA'BIOUS (*Scabiosa*), an extensive genus of herbaceous plants, exclusively natives of the eastern hemisphere, of the natural order *Dipsacaceæ*. See TEASEL. The flowers are collected in terminal heads, surrounded by a many-leaved involucre, so as to resemble those of the order *Compositæ*. The DEVIL'S-BIT S. (S. *succisa*) is a very common autumnal flower in British pastures. The plant possesses great astringency, but no important medicinal virtues, although it was formerly supposed to be of great efficacy in all scaly eruptions, and hence the name S., from Lat. *scabies*, leprosy. The end of the root appears as if abruptly bitten off, and the superstition of the middle ages regarded it as bitten off by the devil, out of envy, because of its usefulness to mankind! The SWEET S. (*S. atropurpurea*) is a well-known fragrant garden-flower. It is supposed to be a native of India.

SCAD (*Caranx trachurus*, or *Trachurus vulgaris*), a fish of the family *Scomberidæ*, sometimes called the *Horse Mackerel*, because of its resemblance to the mackerel, and its comparative coarseness. It is from 12 to 16 inches long, of a dusky olive colour, changing to a resplendent green, waved with a bluish gloss, the head and lower parts silvery, the throat black. There are two small free spines in front of the anal fin. The species of *Caranx* are very numerous, and it is sometimes divided into several genera;



Scad (*Caranx trachurus*).

but the S. is the only one found on the British coasts. It is common on the south-western coasts of England, but comparatively rare to the north. It sometimes appears in immense shoals, pursuing the fry of herring or similar prey, and the multitudes have sometimes been so great and so crowded together, that they could be lifted out of the sea by buckets, and overloaded nets have been torn to pieces. The S. has something of the mackerel flavour. Although not much cared for when fresh, it is often salted, and in that state is esteemed as an article of food.

SCA'FELL, a double-peaked mountain in Cumberland, on the Westmoreland border, 13 miles south-south-west of Keswick, is a chief feature in the scenery of the Lake Country, in the heart and centre of which it stands. Of its two peaks, the higher is 3229 feet, the other 3092 feet in height.

SCAGLIO'LA, a composition made to imitate the more costly kinds of marble, and other ornamental stones; and so successfully is it done, that it is often difficult to distinguish between the artificial and the real stone. It consists of finely ground plaster of Paris mixed with a thin solution of fine glue, and coloured with any of the earthy colours, such as ochres, umber, Sienna earth, Armenian bole, and sometimes chemical colours, such as the chrome yellows, &c. This is spread over the surface intended to represent marble; and whilst still soft, pieces of fibrous gypsum, marble, alabaster, and other soft but ornamental stones, are pressed into it, and made level with the surface. When the composition is set hard, it is rubbed down, and polished with the ordinary stone-polishing materials, which give it a very fine gloss. This kind of work is only adapted for interiors, because scagliola will not bear exposure to damp for any length of time; but its lightness and the extreme ease with which it may be applied to walls, pillars, pilasters, and even cornices, render it very useful for the decoration of the better class of dwellings and public buildings.

SCALA NOVA, a seaport of Asiatic Turkey, stands on an eminence at the head of a gulf of the same name, 40 miles south of Smyrna. The ruins of the ancient city of Ephesus (q. v.) are in the vicinity. An important export trade is carried on. Pop. stated at 20,000. The Gulf of S. N., confined on the south by the island of Samos, is 40 miles long, and about 20 miles broad.

SCALD-HEAD (a corruption probably of *Scaled Head*) is the popular name of a fungous parasitic disease of the scalp (and occasionally of the face and other parts), known in medical phraseology as *Favus*, *Tinea favosa*, and *Porrigo scutulata*. The primary seat of the parasite is in the lowest portion of the hair-follicles, outside the layer of epithelium which covers the root of the hair. The plant is, however, often found in cup-shaped depressions on the surface of the scalp, forming the yellow honeycomb-like masses which suggested the specific name *Favus* (honeycomb) for the disease. The honeycomb crust continues to increase, preserving its circular form and depressed centre, till it occasionally reaches a diameter of nearly half an inch. These crusts commonly appear in crops, and may be either distinct or confluent. 'At a more advanced stage,' says Dr Aitken, 'the epidermis disappears, and a viscid fluid is secreted in such abundance as to form one entire incrustation over the entire head; hence the *Porrigo larvalis*—mask or vizor-like scald-head. The smell of the scab is peculiar, and has been compared to that of the urine of a cat, or of a cage in which mice have been kept. It is probably due to a species of alcoholic fermentation in connection with the vegetable growth.' The scab sometimes resembles a lupine, or a minute shield, rather than the cell of the honeycomb, and hence the varieties of scald-head which have been described under the name of *Porrigo lupinosa* and *Porrigo scutulata*.

Scald-head: A, A, chains of sporules projecting beyond the edges of the hair; B, sporules between the fibres of the hair; C, D, broken-up root end of the hair, with masses of sporules between the laminæ.

The great point to be aimed at in the treatment of this affection is to destroy the cryptogamic parasite, and to eradicate its germ. For this purpose, the head should be shaved, and poultices then applied till the scabs are removed. Tar-ointment should then be applied, night and morning, the old ointment being washed off with soft soap and water before the fresh dose is laid on. Dr Aitken states, that in the early stage of the disease, in place of the preceding treatment, it is sometimes sufficient to cut the hair close, and to wash the affected parts, night and morning, with oil of turpentine. If the disease does not yield to these applications, the same treatment as that recommended for RINGWORM must be tried.

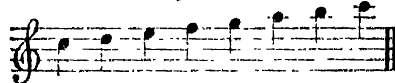
SCALDS. See BURNS.

SCALE-ARMOUR consisted of small plates of steel riveted together in a manner resembling the scales of a fish. From the small size of the plates, it possessed considerable pliability, and was therefore a favourite protection for the neck, in the form of a curtain hanging from the helmet. Scale-armour is now obsolete, except, perhaps, among some eastern potentates.

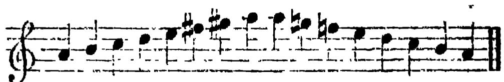
SCALE INSECT. See COCCUS.

SCALE, MUSICAL, a succession of notes arranged in the order of pitch, and comprising those sounds which may occur in a piece of music written in a given key. The ultimate criterion of what should constitute a musical scale, is doubtless what gives most pleasure to a cultivated ear; but the sounds that please the ear are also found to be those that stand in certain simple mathematical relations to each other. Among the ancient Greeks, various different scales or *modes* were in use, of which six were generally enumerated—the Dorian, Phrygian, Lydian, Mixo-Lydian, Ionic, and Æolian. Excepting in the music of the Greek Church and of the Ambrosian Chant, modern musical feeling has rejected all of these but two, the Ionic and Æolian, the former of which is now known as the Major, and the latter the Minor Mode. In both modes, the scale consists of a series of seven steps leading from a given note fixed on as the tonic or key-note to its octave, which may be extended indefinitely up or down, so long as the sounds continue to be musical.

Major Mode.



Minor Mode.



For an explanation of the principles on which these scales are founded, and of their derivation from the harmonic triad, see MUSIC. The major scale is derived from much simpler proportions than the minor. The minor scale requires to be modified by occasionally sharpening its sixth and seventh.

SCALES OF FISHES. They are divided by Agassiz, whose classification is generally adopted, into the *placoid*, *ganoid*, *ctenoid*, and *cycloid* forms. *Placoid* scales (from the Gr. *plax*, a broad plate) lie side by side without overlapping or imbricating. They are often elevated at the centre so as to form a strong projecting point. All the cartilaginous fishes, except the sturgeon, have placoid scales. *Ganoid* scales (from the Gr. *ganos*, splendour) are covered with a fine enamel, and generally of a rhomboidal form and imbricated. The



Fig. 1.—Placoid Scale.

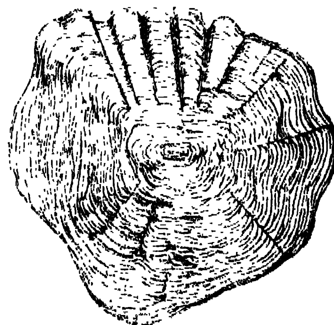


Fig. 2.—Cycloid Scale.

sturgeon and the bony pike (*Lepidosteus*) have scales of this nature, but the finest examples of these scales are found in fossil fishes. *Ctenoid* scales (from *kteis*, a comb) are generally of a rounded or oval form, with teeth or projections on their posterior margin. They are devoid of enamel, and present an imbricated arrangement. The perch and many osseous fishes possess these scales. *Cycloid* scales (from the Gr. *kyklos*, a circle) consist of concentric layers of horn or bone, without spinous margins, and not covered by enamel. They are soft and flexible, present a variety of linear markings on their upper surface, and usually exhibit an imbricated arrangement. The carp, herring, salmon, &c., possess these scales. In many cases, two kinds of scales occur in the same fish, while in other cases the different species of a single genus exhibit different kinds of scales.

For anatomical details regarding the structure and mode of development of scales, the reader is referred to Professor Huxley's article 'Tegumentary Organs' in the *Cyclopædia of Anatomy and Physiology*, and to Professor Williamson's Memoirs in the *Philosophical Transactions*, 1849—1852. In their chemical composition, the scales of fishes approximate to the bones, except that they contain more organic matter. The brilliancy of tint exhibited by many fishes is due apparently to the phenomena of optical interference, rather than to the presence of colouring matter. Figures of Ctenoid and Ganoid Scales are given in the articles CTENOID FISHES and GANOID FISHES.

SCALES OF NOTATION are the various 'radices' which determine, as explained under NOTATION (q. v.), the form and digits of the number expressing any numerical quantity. Thus, the number 289, in the decimal or common system whose radix is 10, signifies 9 units, 8 tens, and 2 hundreds, or $2 \times 10^2 + 8 \times 10 + 9$. To express the same number in the quinary scale, for instance, we must group the 289 units into multiples and powers of 5; an operation which may be performed in either of two ways, as follows:

5)289	280	2124 (quinary)
5)57-4	10	5
5)11-2-1	103 (taking in 8, and	11 carrying by 10)
2-1-2-4	10 carrying by 5)	5
	2124	57
		5
		289

or 2124 (i.e., $2 \times 5^3 + 1 \times 5^2 + 2 \times 5 + 4$) in the quinary scale represents the same numerical quantity as 289 in the decimal scale. The following list shews the same numerical quantity according to the scales having for their radices the first 11 numbers after unity, and will partly indicate the advantages and disadvantages of each scale:

In the *binary*	(radix 2)	scale, . .	100,100,001
" ternary	(" 3)	"	101,201
" quaternary	(" 4)	" . .	10,201
" quinary	(" 5)	" . . .	2,124
" senary	(" 6)	" . .	1,201
" septenary	(" 7)	" . . .	562
" octary	(" 8)	" . .	411
" nonary	(" 9)	" . . .	351
" decimal	(" 10)	" . .	289
" undenary	(" 11)	" . . .	243
" duodecimal	(" 12)	" . .	201

It will be observed that the binary scale possesses only two symbols, 0 and 1, the ternary has 3, while the undenary would require a symbol in addition to the 9 digits and zero to express 10, which is a digit in that scale, and the duodecimal scale two additional symbols for 10 and 11. A glance at the above table shews at once that if the binary scale had been in ordinary use, great facility in the 'performance' of arithmetical operations would have been obtained at the cost of largely increasing their 'extent,' and that both the advantage and disadvantage diminish as we raise the scale. The selection of 'ten' as the ordinary scale is very prevalent, and was evidently suggested by the number of fingers; but the scales of two, three, four, five, six, and twenty have at various times been made use of by a few nations or tribes. The scale of 12 has long been generally employed in business among northern European nations, as is instanced by such terms as 'gross,' signifying 12 times 12, and 'double gross,' denoting 12 times 12 times 12; and it has also been largely introduced into the standard measurements of quantity, as inches, pence, ounces troy, &c., causing a considerable amount of complexity in calculation, as all abstract numerical calculation follows the decimal system. To remedy this acknowledged evil, it has been proposed to introduce the decimal system *in toto*, as has been done in France, Italy, Russia, &c., or else to do the same with the duodecimal system. Those who hold to the first proposal have the argument of conformity in their favour; those who support the latter do so on the ground, that 12 has in proportion far more aliquot parts than 10 has, and that on this account the number of fractions, and the size of each numerator and denominator, would be diminished; while both parties can bring overpowering arguments against the continuance of the present method, or rather want of method. See DECIMAL SYSTEM.

SCALIGER, JULIUS CÆSAR, one of the most famous men of letters that have appeared since their revival, was born in 1484. In after-life, he created for himself a noble pedigree, and made out that he was descended from the princely family of the Scalas of Verona, and that his birthplace was the castle of Riva, on the banks of the Lago di Guarda. According to his own account, he was educated first under the famous Fra Giocondo; was afterwards attached as a page to the Emperor Maximilian, whom he attended for 17 years in peace and war; was next made a pensioner of the Duke of Ferrara; thereafter studied at Bologna; commanded a troop of cavalry at Turin under the French viceroy; prosecuted his studies there in philology, philosophy, and medicine; and in 1525 went to Agen, in France, with the bishop of that diocese, a member of the Rovere family, to whose household he became physician. Tiraboschi's account, however, which is the more probable, represents him as having been born at Padua, the son of Benedict Bordoni, who was a geographer and miniature-painter of that city, and who, either from the sign of his shop or the name of the street he lived in, assumed the surname Della Scala. Up to his 42d year, young Giulio Bordoni resided chiefly in Venice or Padua, engaging in the study and practice of medicine, and appearing under his true name as an author. In 1525, he withdrew to Agen, either from some advantageous offer, or with a view to promote his fortune, and there fixed his abode. He became physician to the bishop of the diocese, and in that capacity sought in marriage Andietta de Roques Lobejac, a young lady only 16 years of age, and of noble and rich parentage. An obstacle was thrown in the way of this alliance; and probably with the purpose of improving his position, and lessening the disparity in station between himself and the object of his affections, he procured, in 1528, letters of naturalisation as a French subject, under the name of Jules-César de Lescalle de Bordonis. This was probably the occasion when he added Cæsar to his baptismal name of Julius. The marriage took place in 1529, and was both happy and fruitful. He died in 1558, leaving behind him a mass of publications on various subjects, and a reputation for extent and depth of learning, which,

considering the ripe age at which he made the majority of his acquirements, redounds to the credit of his vigorous understanding and extraordinary memory. As a thinker, he was more independent than sound; and as a man, was of violently irritable temper and excessive vanity. His best known publications are—*Commentarii in Hippocratis Librum de Insomniis* (Commentaries on the Hippocratic Treatise on Dreams); *De Causis Linguæ Latinæ Libri XVIII.*, celebrated as the first considerable work written in the Latin language in modern times, and not without value even yet; his Latin translation of Aristotle's *History of Animals*; his *Exercitationum Exotericarum liber quintus decimus de Subtilitate ad Hieronym. Cardanum*: his seven books of *Poetics* (also in Latin, and on the whole his best work); his *Commentaries on Aristotle and Theophrastus*; his two orations against Erasmus; his Latin poems, &c.

SCALIGER, JOSEPH JUSTUS, the tenth son of J. C. Scaliger and Andietta de Roques-Lobejac, and much his father's superior in learning, was born in 1540 at Agen, whence, at the age of 11, he was sent, along with two of his brothers, to the college of Bordeaux, where for three years he studied Latin. A pestilence breaking out in the town, he was recalled by his father, who supplemented the scanty knowledge which his son brought home with him by making him write a Latin declamation every day upon any subject he chose. Under this training, he soon attained great proficiency as a Latinist; and in his 19th year, on the death of his father, he went to Paris, where he studied Greek under the famous Turnebus. He was less indebted, however, to any master than to himself; and finding that his progress was slow under his great preceptor, he closeted himself alone with Homer, and in 21 days read him through, with the aid of a Latin translation, and committed him to memory. In less than four months, he had mastered all the Greek poets. Next, Hebrew, Syriac, Persian, and the most of the modern European languages succumbed in rapid succession to his industry, while at the same time he was assiduous in his composition of verses both in Latin and Greek. About this time, he boasted that he could speak 13 languages, ancient and modern; and such was his ardour in study, that he allowed himself only a few hours' sleep at night, and would frequently pass whole days without rising from his books even for meals. His proficiency in literature, especially in the history, chronology, and antiquities of Greece and Rome, secured him, in 1583, an honourable engagement from Louis de la Roche Pozay, at that time French ambassador at the pontifical court. The year before, however, he had become a Protestant, which rendered it difficult for him to retain an appointment in France. Except that he travelled a good deal, at the generous instance of his patron, and visited the chief universities of France and Germany, and even found his way to Scotland, we know little of his life between 1565 and 1593. He is conjectured to have travelled in Italy, and to have gone as far as Naples. Certain it is, however, that in the year last named he complied with an invitation of the Dutch government, and went to fill the chair of Literature, vacated by Lipsius in Leyden University, where he spent the residue of his days. His labour now consisted chiefly in interpreting and illustrating the classical authors. He died of dropsy on the 21st January 1609, and was never married. We have said that he far excelled his father in learning; but it should be added that he was not a whit less irritable, arrogant, or vain, that he fully shared the paternal pride of pedigree, spurious as he probably knew his own to be; and that he endeavoured to support his father's genealogical fictions in his well-known letter to Dousa on the splendour of the Scaliger family. His writings abound with expressions of hatred and contempt towards his opponents, and he has enriched the vocabulary of learned abuse to an extent well nigh proverbial. He was, however, a man of immense vigour of understanding, and must be credited with having been the first to lay down, in his treatise *De Emendatione Temporum* (Paris, 1583), a complete system of chronology formed upon fixed principles. It was this most learned achievement, and his invention of the Julian period, that secured for him the title of the Father of Chronological Science. It was subjected to much emendatory criticism by censors like Petavius, and also by himself, its errors having been partly corrected by him in his later work, the *Thesaurus Temporum, complectens Eusebii Pamphili Chronicon cum Isagogicis Chronologiæ Canonibus* (Amst. 1658, 2 vols. fol.). Among the classical authors whom he criticised and annotated are Theocritus, Seneca (the tragedies), Varro, Ausonius, Catullus, Tibullus, Propertius, Manilius, and Festus. His other works are *De Tribus Sectis Judæorum*; *Dissertations on Subjects of Antiquity*; *Poemata*; *Epistolæ*, a translation into Latin of two centuries of Arabian proverbs, &c. He numbered among his friends the most illustrious scholars of the time, such as Lipsius, Casaubon, Grotius, Heinsius, the Dupuys, Saumaise, Vossius, Velser, P. Pithou; and interesting notices of him are preserved in such works as the *Huetiana*, and above all, in the two vols. of *Scaligerana*, which embody his conversations, and which were collected and published after his death.

SCALLOP, more commonly ESCALLOP (q. v.), in Heraldry, a species of shell. It has been considered the badge of a pilgrim, and a symbol of the apostle St James the Greater, who is usually represented in the garb of a pilgrim.

SCALLOP-SHELL. See PECTEN.

SCALP, THE, is the term employed to designate the outer covering of the skull or brain-case. Except in the fact, that hair in both sexes grows more luxuriantly on the scalp than elsewhere, the skin of the scalp differs so slightly from ordinary skin that it is unnecessary to enter into any details on this point. But besides the skin, the scalp is composed of the expanded tendon of the occipito-frontal muscle, and of intermediate cellular tissue and blood vessels. Injuries of the scalp, however slight, must be watched with great caution, 'for they may be followed by erysipelas, or by inflammation and suppuration under the occipito-frontal muscle, or within the cranium, or by suppuration of the veins of the cranial bones, and general pyæmia that may easily prove fatal.'—Druitt's *Surgeon's Vade Mecum*, 8th edition, p. 332. In the treatment of a wound of this region, no part of the scalp, however injured it may be, should be cut or torn away; and, if possible, the use of stitches should be avoided, as plasters and bandages will generally suffice to keep the separated parts in apposition. The chance of suppuration may be prevented by coagulating the blood externally, by dressing the wound with lint, saturated with *Friars' Balsam* (*Tinctura Benzoin, Comp.*), so as to seal up the injured part from the access of air. The patient should be confined to the house (and in severe cases to bed), should be moderately purged, and fed upon non-stimulating, but not too low diet.

Burns of the scalp are very liable to be followed by erysipelas and diffuse inflammation, but the brain is comparatively seldom affected in these cases.

Tumours of the scalp are not uncommon, the most

frequent being the cutaneous cysts popularly known as *Wens* (q. v.), and vascular tumours.

SCAMA'NDER, the ancient name of a river in the Troad (see TROY), which, according to Homer, was also called Xanthus (Gr. yellow) by the gods, and as a divinity took an important part in the Trojan war, its destructive floods doing serious injury to one party, and thus materially assisting the other. The S. rose in Mount Ida (q. v.), and, flowing west and north-west, discharged itself into the Hellespont, after being joined by the Simois, about two miles from its mouth: the two rivers, however, since the 1st c. A.D., have had separate courses. There has been much controversy as to what modern river corresponds to the ancient S.; Mr C. Maclaren, however, in his *Plains of Troy*, has clearly identified it with the Mendere.

SCAMI'LLUS, a small plinth below the bases of Ionic, Corinthian, and other columns.

SCA'MMONY is a gum-resin of an ashy-gray colour, and rough externally, and having a resinous, splintering fracture. Few drugs are so uniformly adulterated as scammony, which, when pure, contains from 81 to 83 per cent. of resin (which is the active purgative ingredient), 6 or 8 of gum, with a little starch, sand, fibre, and water. The ordinary adulterations are chalk, flour, guaiacum, resin, and gum tragacanth.

Scammony, when pure, is an excellent and trustworthy cathartic of the drastic kind, well adapted for cases of habitual constipation, and as an active purgative for children. The resin of scammony, which is extracted from the crude drug by rectified spirit, possesses the advantage of being always of a nearly uniform strength, and of being almost tasteless. The *Scammony Mixture*, composed of four grains of resin of scammony, triturated with two ounces of milk, until a uniform emulsion is obtained, forms an admirable purgative for young children in doses of half an ounce or more. According to Christison, 'between 7 and 14 grains of resin, in the form of this emulsion, constitute a safe and effectual purgative' for adults. Another popular form for the administration of scammony is the *Compound Powder of Scammony*, composed of scammony, jalap, and ginger, the dose for a child being from 2 to 5 grains, and for an adult from 6 to 15 grains. Scammony is frequently given surreptitiously in the form of biscuit to children troubled with thread-worms.

The plant which produces this valuable drug is *Convolvulus Scammonia* (see CONVOLVULUS), a native of the Levant. It is a perennial, with a thick fleshy tapering root, 3—4 feet long, and 3–4 inches in diameter, which sends up several smooth slender twining stems, with arrow-head-shaped leaves on long stalks. The root is full of an acrid milky juice, which indeed pervades the whole plant. The scammony plant is not cultivated, but the drug is collected from it where it grows wild. The ordinary mode of collecting scammony is by laying bare the upper part of the root, making incisions, and placing shells or small vessels to receive the juice as it flows, which soon dries and hardens in the air.

The name *French* or *Montpelier Scammony* is given to a substance which is prepared in the south of France, chiefly from the juice of *Cynanchum Monspeliacum*, a plant of the natural order *Asclepiaceæ*. It is a violent purgative.

SCA'NDALUM MAGNA'TUM. This offence was committed in speaking words in derogation of a peer, judge, or great officer of the realm, and a special action was brought for such words, the punishment being damages and imprisonment. But now this proceeding, though not expressly abolished, is superseded by the ample remedies of Criminal Information (q. v.), indictment, or action. A somewhat similar offence in Scotland is called Leasing-making (q. v.).

SCANDERBEG (properly, *Iskander-beg*, 'the Prince Alexander,' the name given him by the Turks), the famous patriot chief of Epirus, was born in that country in 1414. His real name was George Castriota, and his father, John Castriota, was one of the great lords of Epirus, his mother, Voisava, being a Servian princess. In 1423, he was given as one of the hostages for the obedience of the Albanian chiefs, and his physical beauty and intelligence so pleased Amurath II., that he was lodged in the royal palace, and subsequently circumcised and brought up in Islamism, being also put under the tuition of skilful masters in the Turkish, Arabic, Slav, and Italian languages. In 1433, he greatly distinguished himself in Asia as a Turkish pasha (of one tail); but being offended at the confiscation of his paternal domains, and being solicited by some Epirote friends to return to his native country to aid in the restoration of its independence, he watched an opportunity of withdrawing from the Turkish army. He had not long to wait, for the generous and unsuspicious sultan, who had caused him to be brought up as if he had been his own son, gave him the command of a large division of the army which was destined to act against the Hungarian invaders. S., having concerted his plans with 300 of his fellow-countrymen in the Turkish army, deserted during the confusion of the first battle (1443), and having previously compelled Amurath's secretary (whom he afterwards murdered to avoid detection) to prepare an order investing him with the government of Croia (now *Ak-hissar*), the capital of Epirus, he and his companions fled thither with all possible speed. The unsuspecting governor at once resigned the town into his hands, and was massacred along with the garrison. At the news of S.'s success, the whole country rose in insurrection, and in 30 days he had driven every Turk, except the garrison of Sfetigrad, out of the country. In order to strengthen himself in his new position, he invited a number of the neighbouring princes and Albanian chiefs to a conference, at which it was unanimously agreed to make no terms with the Turks, and to obey S. implicitly as their leader. S. then raised an army of 15,000 men, with which he completely scattered (1444) the 40,000 Turks whom the indignant sultan had sent against him, killing an immense number of them, and taking a few prisoners. Three other Turkish armies shared the same fate, and the 'animus' with which the contest was carried on may be imagined, when we consider that the number of prisoners taken in the last (1448) of these three battles amounted to *seventy-two*. Amurath himself in 1449 took the field, and stormed many of the principal fortresses, but being then ill of his fatal malady, he retired from before Croia, to die at Adrianople (1450). S.'s splendid successes brought in congratulations from the pope and the sovereigns of Italy and Aragon, but many of the Epirote chiefs were becoming wearied of the continual strife, and fell off from him, some of them even joining the Turks. S.'s career was now, in consequence, of a more chequered character, but in spite of occasional defeats, he stoutly refused all the liberal and fair proposals of the sultan, Mohammed II., who had a profound admiration for him, and sheltered by the mountainous nature of the country, carried on an unceasing warfare. At last an armed convention was agreed to in 1461, and S. profited by this leisure to pay off his debt to the pope and the king of Aragon (both of whom had supplied him with material assistance during his greatest need),

and crossing over to Italy, he routed the partisans of Anjou, and restored the kingdom of Naples to the latter of his benefactors, returning home laden with honours and benedictions. At the instigation of the pope, who had tried in vain to raise the other Christian princes of Europe against the Turks, S. broke the armed truce in 1464, and repeatedly defeated the Turks; but Mohammed becoming furious at these unprovoked aggressions, equipped two mighty armies, the first of which invested Croia, and the second, under his own leadership, advanced more leisurely. The first army was, after a desperate contest, defeated by S. in 1466; but the restless and indomitable chief, worn out with the incessant toil of 24 years, died at Alessio, 17th January 1467. The war continued to rage some time longer, but the great mainstay of the country was now wanting, and before the end of 1478, the Turkish standard floated undisturbed over Epirus. Barlesio, a fellow-countryman of S., who has written his biography (*De Vita et Moribus ac rebus gestis Geo. Castrioti*, Rome, 1537), remarks his sobriety, the purity of his manners, and the strictness of his religious belief. He had vanquished the Turks in 22 pitched battles.

SCANDINAVIA, a large peninsula in the north of Europe, bounded on the N. by the Arctic Ocean; on the W. by the Atlantic, North Sea, Skager Rack, Cattegat, and Sound; and on the S. and E. by the Baltic Sea, Gulf of Bothnia and Finland, with which it is connected on the north-east by an isthmus 325 miles wide. This peninsula comprises the two kingdoms, Norway (q. v.) and Sweden (q. v.); is 1240 miles long, from 230 to 460 miles broad, area 300,000 sq. miles. The ridge of mountains which traverses the peninsula in the direction of its length gives character to the whole conformation. The western division of the Scandinavian peninsula is covered with mountains; the eastern half, Sweden, consists principally of low-lying country. The mountains of S. extend from Waranger Fiord, in the extreme north-east, to the promontory of the Naze, in the extreme south-west, with an average breadth of 180 miles. They consist principally of gneiss and micaceous schist, sometimes, but rarely, of porphyry, syenite, granite, and chalk; salt is not found; silver, copper, and iron abound. The Scandinavian Mountains, though forming in reality one great range, are considered as forming four sections—the Lapland Mountains, in the north, from 1000 to 2060 feet high; the Kjolen Mountains, from 1500 to 2575 feet high; the Dovre Fjelde, from 2500 to 3600 feet high; and lastly, the Southern Fjelde, 4000 to 5150 feet high. Though of inconsiderable height, yet the numerous glaciers and snow-fields of the mountains of S. impart to this range almost an Alpine character. The climate of S. is much milder on the west than on the east side, a fact to be ascribed probably to the influence of the Gulf Stream. The character of the country, its physical features, industries, &c., are given under the articles NORWAY and SWEDEN.

The ancient *Scandia*, or S., included Northern Denmark, as well as the peninsula that still retains the name. It is first mentioned by Pliny, who, unaware that the peninsula was attached to Finland on the north, considered S. as an island.

SCANDINAVIAN LANGUAGE AND LITERATURE. The language which was spoken during the heathen ages in all the northern or Scandinavian lands, and which, in accordance with traditionary belief, had been introduced by Odin and his companions, when the Gothic tribes supplanted the more ancient races of the Finns and Lapps, is always referred to by the oldest authorities either as the *Dönsk túnga*, 'Danish tongue,' or as the *Norræna*, 'Norse.' We never hear of the 'Swedish' or 'Gothic tongue,' and although different dialects no doubt existed, from a very early period, among the Scandinavian people, it is certain that substantially the same language was spoken by the Northmen generally till the 11th century. According to recent inquirers, the race of the Northmen, before their settlement in Sweden and Norway, was divided into an eastern and western branch, the former of which is supposed to have used the old language of Norway and Iceland, and the latter the Swedish and Danish dialects. These two divisions of the race had entered Scandinavia by different routes, the eastern having passed along the Gulf of Bothnia, through the country of the Finns and Lapps, while the western branch had crossed from Russia to the Aland Islands, and spread from thence southward and westward; and it seems natural to infer that in their respective lines of migration they may have incorporated into their own speech some of the special characteristics that belonged to the language of the peoples with whom they came in contact. But the differences thus introduced could not have been important, for we find the same language employed in the several most ancient laws of the different people of Scandinavia, while the two Eddas (q. v.)—the oldest monuments of Scandinavian speech—which were compiled in Iceland, whither the Northmen had carried their language on their settlement in the island in the 9th c., give evidence of an almost complete identity of local and personal names. This unity of language is further proved by the agreement which is found to exist in all runic inscriptions, from Slesvig to the northern parts of Sweden, and from Zealand to the western shores of Iceland. All monuments of this old Northern tongue would, however, have been lost to us, had not the Norræna or Norwegian form of it been carefully preserved and cultivated in Iceland through the short songs (*hljod* or *quida*) relating to the deeds of the gods and heroes of the north, which had existed as early probably as the 7th c., and had passed with the religion and usages of Norway to the new colony. After the introduction of Christianity into Iceland in the year 1000, schools were founded there, classic literature was cultivated, and Roman characters were adopted for the writing of the national tongue, but this did not interfere with the zeal with which the national laws and poems were collected and studied by native scholars. This literary activity continued unabated till the 13th c., when the republic of Iceland, after having long been distracted by the dissensions of the rival aristocratic families of the island, was conquered by Hakon VI., king of Norway. Since 1380, Iceland has formed part of the Danish dominions, and although since that period the colonists have partly succumbed to the cramping influences of the subordinate and dependent conditions in which they have been placed; the distance from the mother-country, and the tenacity with which the people cling to all memorials of their former history, have enabled them to preserve their language so unchanged, that the Icelander of the present day can read the sagas of a thousand years since, and still writes in the same phraseology that his forefathers used ages ago. But while the old Scandinavian tongue was thus preserved in the far distant colony, it had undergone great changes in Norway; and when, by the union of Calmar in 1380, the latter country was united to Denmark, the Danish form of speech, that had in the meanwhile been changing under the modifying influences due to the introduction of Latin and to contact with other nations,

supplanted the Norwegian language, which thenceforth being banished from the pulpit, the law courts, and from literature, split up into numerous dialects peculiar to special valleys and fijords, but unknown in the larger towns.

When we come to examine the Icelandic or ancient Scandinavian, which is closely allied to its sister Teutonic languages, and like them betrays its eastern origin, we find that it differs from the latter in several important points. It has this striking peculiarity, that the definite article, instead of coming before the noun, is appended as a termination to the end of the word. The adjective, moreover, which in its indefinite form is subject to inflections, for all genders and cases, undergoes, when in its definite form, fewer and slighter changes. Again, while in the German tongues the verb in the infinitive ends in a consonant, in the old Scandinavian it invariably terminates in a vowel. The old Scandinavian language has a passive form of the verb unknown to its Gothic sister tongues; and while in German the third person of the present tense differs from the second person, such is not the case in Old Northern. In the latter, the vowel sounds are greatly modified by a very perfect system of combinations, indicated by dots or accents; and in addition to the consonants of the Gothic languages, it has an aspirated *d* and *t*. It possesses, moreover, a flexibility and richness of construction, which admit of favourable comparison with those of the ancient classical languages, while in regard to the number and comprehensiveness of its words, and its consequent independence of foreign derivates, it presents a character of regularity and unity which is wanting to the other Germanic languages. Its mode of construction is simple in prose, and in the earlier forms of poetry, although in the later periods of the Skalds (q. v.) it degenerated into a state of artificial complexity. The chief feature of the metrical system employed in Old Northern poetry was alliteration (q. v.). The alliterative method was continued after the introduction of terminal rhyme, but the simplicity of the ancient lay gave way in the 10th c. to the most artificial complexity of versification in the metres invented by the skalds. Besides these skaldic measures, of which 106 are enumerated in the *Hattalykli*, or Key of Metres, drawn up in the 13th c. by the Icelander, Snorri Sturlesson (q. v.), the skalds were required to know the *Kenningar*, or poetic synonyms, of which there are an enormous number; some words, as Odin, island, &c., having upwards of 100. The main feature of the system was that nothing must be called by its right name: thus a ship was a beast of the sea, a serpent of the waters, a dragon of the ocean, &c.; a woman was a graceful tree, a fair pearl, &c.; a wife was her husband's *Rune* (q.v.), or his confidential and intimate friend, &c.

The fragments of Old Northern poetry that have come down to us in the *Eddas*, belong for the most part to the 8th c., or even perhaps to the 7th c.; and consist of short songs (*hljod* or *quida*), which are either mystic, didactic, mythic, or mytho-historic in their character. See EDDA. It is supposed that some of these compositions, and several of the poems which celebrate the adventures of the gods, giants, and elves, were composed prior to the immigration into Scandinavia of Odin and his followers; while, on the other hand, the local colouring of others sufficiently prove their northern origin. In addition to the subjects belonging to the Odinic mythology, we have in the mytho-historic lays, known as the songs of the famous Smith Völundr, or the *Völundar-quida*, a cyclus of heroic poems similar to the Old German epic the *Nibelungenlied*, (q. v.); but much more ancient in form than that in which the latter has reached us. In the 9th and 10th centuries the ancient epic and the simple songs of the older poets gave place to the artificial poetry of the skalds, which, from its earliest development, manifested a realistic tendency, and made the real adventures of living men the subject of their compositions. Many of these compositions, as the *Eiriksmál*, or the Death and Apotheosis of King Eric Blood-axe, who died in 952; the *Hakonar-mal*, or Fall of Hakon the Good; and several poems by the famous Icelandic skald Egill Skalagrimson, while they afford valuable materials for the early history of the north, are among the latest of the skaldic productions that preceded the more degenerate periods of the art. To the 11th and 12th centuries belong the poems known as *Grougaldr* and *Solar-ljod*, which were composed in imitation of the ancient compositions, and consist of moral and didactic maxims, the former conceived from an assumed heathen, and the latter from a Christian point of view. In the 13th c., the skaldic art thoroughly declined, and gave place, in Iceland, to a puerile literature, based upon Biblical stories and saints' legends. In Scandinavia Proper, a more modern form of national literature was in the meanwhile being gradually developed by means of oral transmission, whence arose the folk-lore and popular songs of Norway and Sweden, and the noble Danish ballads known as the *Kæmpe viser*, whose composition in the Old Northern or Icelandic tongue may probably be referred to the 14th century. The earliest Icelandic prose belongs to the beginning of the 12th c., when Ari 'hinns Frode,' or the Wise, composed a history of his native island and its population in the *Islendinga bok* and *Landnama-bok*, the latter of which was continued by others. He was the first northern writer who attempted to assign fixed dates to events by reference to a definite chronology, and his work is remarkable as the earliest historical composition written in the old Danish or Norse, as it still remains in the living language of Iceland. These works, which have since perished, entered largely into the composition of the annals of the early kings of Norway, compiled a century later by Snorri Sturlesson under the title of the *Heimskringla*. Throughout the middle ages the literature of Iceland was enriched with numerous national and other sagas, the materials of which were drawn from skaldic songs, folk lore, local traditions and family histories; and in its later stages of development included among its subjects the mythic cycle of Arthur and his knights, Merlin, Alexander, Charlemagne, &c. The compilation of the laws of the island attracted the attention of the Icelanders at an early period; and in 1118 a complete code, known as the Gragas, which had been derived from the ancient Norse law, was submitted to the All-thing or popular assembly, and a few years later the canons of the church, or the *Kristinrettr*, were settled and reduced to writing. A collection of those enactments in the ancient and subsequent codes, which are still in force in Iceland, has been made by Stephensen and Sigurdsson (Copen. 1853), under the title of *Lagasafn handa Islandi*; while the ancient Norse laws, beginning with the *Gulathings lög* and the *Hirdskra* of Hakon the Good, which date from the 10th c., have been ably and critically edited in Norway under the title of *Norges gamle Love* (Christ. 1846–1849). The study of the Old Northern language and literature, which was successfully inaugurated by the native scholars of Iceland in the 17th c., was soon prosecuted with equally happy results in Denmark and Sweden, and within the last 20 years in Norway, where the subject forms a necessary introduction to the investigation of the language and history of the

country. Copenhagen has, however, in recent times, been the principal seat of these inquiries, the successful prosecution of which has been materially facilitated by the large number of important Icelandic MSS. contained in its libraries, and by the foundation of the Arne-Magnussen collection in 1772; and the different societies especially designed to promote the study of Icelandic and of northern antiquarian monuments. Among the Icelandic and Danish scholars who have gained pre-eminent distinction in these departments of research, we may instance Arne-Magnussen, Torfæus, Olavsen, Finn Magnussen, Worm, Resenius, Bartholin, Thorlacius, Müller, Rask, Rafn, Keyser, Munch, Unger, Lange, &c. In the study of the grammar and comparative structure of the language, which excited an interest as early as the 13th c., as is proved by the grammatical treatises and rules of prosody incorporated in the younger *Edda*, no one has evinced a higher order of scientific acumen and critical learning than Rask (q. v.), who in his erudite work *Om det gamle Nordiske Sprogs Oprindelse* (Kjøpenh. 1818) threw a flood of new and important light on the subject; while the labours of Jakob Grimm, Munch, and others, have tended materially to exhibit the affinities between the Old Northern and the Teutonic languages, and to assign to it its right position among the kindred Indo-Germanic tongues.

SCANDINAVIAN MYTHOLOGY. Our knowledge of Scandinavian mythology is mainly derived from the collections of ancient Northern sagas known as the Eddas (q. v.), which constitute the Odinic Bible, as it were, of heathen Scandinavia. The value and interest attaching to these records of the ancient faith of the Northmen are enhanced by the fact that there are strong grounds for assuming that the closest affinity, if not identity, of character existed between their religious doctrines and practices and those of the Germanic nations generally. Hence, in the absence of anything beyond the incidental notices of the Pagan religion of Germany, which are contained in the classic writers, the Eddaic exposition of northern mythology is of the highest importance to the student of the history of every nation of Teutonic origin. Owing to the remote situation of the Scandinavian lands, and the hold which the Odin religion had taken of the minds of the Northmen—whose natural tendencies inclined more to the Pagan merits of valour, courageous endurance of hardships, indomitable resolution, and unflinching fidelity in hate and love, than to the Christian virtues of submission, meekness, and forgiveness of injuries—Christianity took root slowly and insecurely in those lands, and only long after a national literature, based upon the superstitions and memorials of the ancient faith, had been firmly established among the people. But although there is every reason to believe that all branches of the great Indo-Germanic family of nations had essentially the same system of belief and worship, and venerated the same deities, minor differences were numerous. Thus, for instance, while Danes, Saxons, and Gothlanders worshipped Odin as their chief god, the Swedes generally paid supreme honours to Frey, the god of the year; some tribes of Northern Germany regarded Hlodyn, or the Earth, as their principal deity; and the Norwegians directed their worship to Odin's son, Thor; while in some parts of Norway even, as in Halgoland, the people worshipped deities not honoured elsewhere in Scandinavia. Thus the chief objects of worship in the latter district were Thorgerd, Horgabrud, and Irpa, the daughters of Halogi, or high flame, from whom the name of the country was derived, and who was probably identical with Loki (Fire), who, after having, according to the myth, been beneficent in the beginning of time and united with the All-father, fell from his high estate, and, like some fallen angel, became crafty, evil, and destructive as a desolating flame. Halgoland appears from remains discovered there to have been a special seat of fire or sun worship, which seems to have been nearly universal at one period of the world's history.

Leaving for the present the discussion of the sources from whence the northern mythology derived some of the numerous complex elements which entered into its composition, we proceed to give a short summary of its cosmogony:—In the beginning of time a world existed in the north called Niflheim, in the middle of which was a well, Hvergelmeer, from which sprang twelve rivers. In the south was another world, Muspelheim, a light, warm, radiant world, the boundary of which was guarded by Surt with a flaming sword. Cold and heat contended together. From Niflheim flowed venomous, cold streams called Elivaager, which, hardening into ice, formed one icy layer upon the other within the abyss of abysses that faced the north, and was known as the Ginnunga-gap. From the south streamed forth the sparkling heat of Muspelheim; and as heat met cold, the melting ice-drops became instinct with life, and produced, through the power of him who had sent forth heat, a human being, Ymir, the progenitor of the frost-giants, by whom he was called Œrgelmer, or Chaos. He was not a god, but evil, both he and all his race. As yet there was neither heaven nor earth, neither land nor sea, but only the abyss Ginnunga-gap. Ymir drew his nourishment from the four milky streams which flowed from the udders of the cow Aedhumla, a creature formed from the melting frost. From Ymir there came forth offspring while he slept—a man and woman growing from under his left arm, and sons from his feet; and thus was generated the race of the frost-giants, or Hrimthursar, among whom the All-father dwelt in the beginning of time before the heavens and the earth were created.

In the meanwhile, as the cow Aedhumla licked the frost-covered stones, there came forth the first day a man's hair, the second day a head, and the third day an entire man. This man, *Buri*, or the Producing, had a son *Bör* (the Produced), who married Beltsa, one of the giant race, by whom he had three sons, Odin, Vili, and Ve.

These three brothers, who were gods, slew Ymir, and carrying his body into the middle of Ginnunga-gap, formed from it the earth and the heavens. Of his blood they made all seas and waters, taking the gore that flowed from his body to form the impassable ocean which encircles the earth; of his bones they made the mountains, using the broken splinters and his teeth for the stones and pebbles; of his skull they formed the heavens, at each of the four corners of which stood a dwarf, viz., Austri at the east, Vestri at the west, Northri at the north, and Suthri at the south. Of his brains they formed the heavy clouds, of his hair plants and herbs of every kind, and of his eyebrows they made a wall of defence against the giants round Midgard, the central garden or dwelling-place for the sons of men. Then the three brothers took the glowing sparks that were thrown out of the world Muspelheim, and casting them over the face of heaven, raised up the sun, moon, stars, and fiery meteors, and appointed to each its place and allotted course; and thus arose days, months, and years.

Night was of the race of the giants, and in turn married three husbands, by one of whom she had a daughter, Earth, and by another a son, Day, who was bright and beautiful like the gods, or Œsir, to whose race his father Delling belonged. To this

mother and son, who were akin to the opposite races of the frost-giants and the gods, Allfader committed chariots and horses, and placed them in heaven, where Night rides first through her twenty-four hours' course round the earth with her horse Hrimfaxi, from whose bit fall the rime-drops that each morning bedew the face of the earth. Close after her comes her fair son Day, with his horse Skinfaxi, from whose shining mane light beams over heaven and earth. All the maidens of giant race were not dark like Night, for to Mundilfori were born a son and daughter of such beauty that their father gave to them the names of Mani or Moon, and Sol or Sun. The gods, incensed at this presumption, took them up to heaven, and ordained that they should direct the course of the sun and moon, which had been made to give light to the world, and thenceforth Sol drove the chariot of the Sun, which was drawn by two horses, Arvakur (the Watchful) and Alsvith (the Rapid), under whose shoulders the gods in pity placed an ice-cool breeze. A shield named Svalin (the Cooling) was also by their care attached to the front of the car, to save sea and land from being set on fire. Mani directs the course of the moon, and he, like his sister, is followed by a wolf that seems about to devour him; and in the end of time this animal, which is of giant race, will with his kindred swallow up the moon, darken the brightness of the sun, let loose the howling winds, and sate himself with the blood of all dying men.

When heaven and earth were thus formed, and all things arranged in their due order, the chief gods or Œsir, of whom there were twelve, met in the middle of their city Asgard, which lay on the plain of Ida. These gods were Odin, or All-father, who has twelve names in Asgard besides many others on earth; Thor, Baldur, Tyr, Bragi, Heimdal, Hod, Vidar and Vali his sons, and Niord, Frey, Ull, and Forsetti. Here they raised for themselves a court with a high seat for All fader; a lofty hall for the goddesses; and a smithy, in which they worked in metal, stone, and wood, but chiefly in gold, of which precious substance all the implements which they used were made, and hence this period of their existence was known as the Golden Age.

This age of peaceful labour lasted till three beautiful, but evil maidens made their way from the giants' world, Jotunheim, to Asgard, when confusion and ill-will arose in the world. Then the gods, taking counsel, determined to create new beings to people the universe, and first they gave human bodies and understanding to the dwarfs, who had been generated like maggots within the dead body of Ymir, but who now took up their abodes in the bowels of the earth, in rocks and stones, and in trees and flowers. Then Odin, with two companions, Hænir and Lodur, went forth on an excursion to the earth, where finding two trees, Ask and Embla, created a man and a woman of them, Odin giving them spirit or the breath of life, Hænir sense and motion, and Lodur blood and a fair colour, with sight, speech, and hearing; and from this pair, whose dwelling was in Midgard, the human race has sprung. A bridge of three colours, Bifrost, known to men as the rainbow, connects Midgard with Asgard, and over this the gods ride daily on their horses to the sacred fountain of Urd, where they sit in judgment. This fountain lies at one of the three roots of the ash, Yggdrasil, whose branches spread over the whole world and tower above the heavens. Under one of these roots is the abode of Hel (q. v.), the goddess of the dead, under another, that of the frost-giants, while under the third is the dwelling of human beings. Below the tree lies the serpent Nidhogg, who is constantly gnawing the roots, and striving with his numerous brood of lesser serpents to undermine Yggdrasil, whose branches are as constantly refreshed by water from the well of Urd, which is poured over them by the Norns. These are three maidens known as Urd, Verdandi, and Skulld (or Past, Present, and Future), who dwell in a fair hall below the ash-tree, where they grave on a shield the destiny which they determine for the children of men.

Besides gods, frost-giants, dwarfs, and men, there were other beings, as the Vanir, who dwelt in the world Vanaheim, lying between the abodes of the gods and of men, and the Light Elves and Dark Elves, the former of whom were friendly to mankind, and of great beauty, while the latter were of evil demoniacal natures, and blacker than pitch.

Now, after the three giant maidens came to Asaborg, dissensions soon broke out among these different races, and Odin, by casting a spear among mankind, created war and discord in the world. Then his maidens, the Valkyriur (or choosers of the doomed), surrounded by lightnings, rode forth with bloody corselets and radiant spears, to choose on every battle-field those who should fall, and to lead them into Valhal, where the chosen heroes, known as Einheriar, daily go forth to fight and slay one another, but returning at early morn sound and fresh, recruit themselves for the next night's combats by drinking beer with the gods and eating the flesh of the sacred hog. It is, however, only men of rank, as jarls (or earls), who enter Odin's hall after death, for the base-born, or thralls, belong to Odin's powerful son, Thor (q. v.), who rules over Thrudheim, and drives through the world in a chariot drawn by he-goats bearing with him his magic hammer Miolnir, the iron gloves which he requires to grasp the haft, and his belt of power.

Among the gods there reigned good-will and happiness even after the rest of the world had been disturbed by war, until Loki, or the impersonation of evil, who in infancy had been Odin's foster-brother, was admitted into Asaborg as their equal. By his treachery Baldur (q. v.), the purest, most beautiful, and best loved of Odin's sons, was slain. The gods, indeed, had power to inflict temporary punishment on Loki, and to chain him under a hot sulphur spring, where he lay for ages, but at length a time will come when Loki's evil progeny will prevail over the gods and the world. This terrible age of destruction, the Ragnarök, or twilight of the gods, will be marked by a three years' winter of hard frost, cutting winds, and sunless air uncheered by summer or spring-tide, when there will be bloodshed throughout the world, brothers will slay one another, parents and children will be at war. The wolf Fenrir will break loose, the sea will burst its bounds as the serpent Jormundgard, encircling Midgard, writhes in fierce rage, and struggles to reach the land. The wolf Skoll will swallow up the sun, and when the world is plunged in almost total darkness, his brother Hati will devour the moon, while the stars will vanish from heaven. As Midgard's serpent and the wolf Fenrir go forth, scattering venom through air and water, the heavens will be rent asunder; the ship Naglfar, which is made of dead men's nails, will be floated on the waters; the Œsir will ride forth across the bridge Bifrost, which will break away behind them; and all the friends of Hel, led on by Loki, will offer battle to the gods on Vigrid's plain. Then Odin, having taken counsel at Mimir's well, will advance armed with his spear Gungnir against the wolf Fenrir, while Thor encounters Midgard's serpent, and is killed by the venom which it exhales from its mouth. Although Fenrir, the wolf, will swallow Odin, and thus cause his death, he will

himself be slain by the god Vidar, while Loki will fall beneath the hand of Heimdal, the watchman of the gods, and Surt, hurling fire from his hand, will burn up the whole world. After the conflagration of heaven and earth and the whole universe, there will still be dwellings for the evil and the good, the worst of which is Nastrond, a horrible habitation for perjurers and murderers, where serpent-heads pouring forth venom line the walls, while in Gimli, Odin's best heaven, the good and virtuous will find a happy resting-place.

But from the great destruction of the universe another earth, verdant and fresh, will arise from the deep waters of the ocean, the unsown fields will bear fruits, and all evil will cease; Baldur and other gods will then return to Ida's plain, where Asgard once stood, and taking counsel together, will find the golden tablets which their race had possessed at the beginning of time, and remembering their deeds of old, will await the coming of the mighty All-father, the ruler of all things, who will pronounce judgments, and establish peace that shall endure to the end of time.

The above brief epitome of the Odin cosmogony serves as a framework for the numerous beautiful prose and poetic myths which make up the substance of northern mythology; and are contained in a rich mass of sagas, not all complete in themselves, but each capable of throwing some light on the others.

Many theories have been advanced to explain the origin and the fundamental ideas on which the northern myths have been based; and while some expositors have seen in them a mere re-clothing of Bible narratives, and a perversion of Christian truths, and have referred their composition to monks living in the middle ages, others, feeling that their title to antiquity could not be set aside, have gone to the other extreme, and tried to prove that they reflected the truths of Christianity, and represented under active and tangible forms the mysteries of Revelation; and that thus, for instance, in the narrative of Thor crushing the serpent we have a figurative delineation of Christ. Other interpreters, again, have attached very different meanings to these myths, regarding them as historic, psychical, physical, or even chemical; but against each of these assumed modes of explanation, taken in their full integrity, conclusive arguments might be adduced; and all that can be safely accepted is, that they are partly historical and partly an impersonation of the active forces of nature. Like the northern languages, their original seat was in the south and east, where kindred mythologies existed among the ancient tribes of India and Persia; and it is probable that the more practical and energetic spirit of the northern myths, and the more warlike character of the gods of the north, when compared with the reflective and contemplative nature of their oriental prototypes, may be due to the gradual effect on the minds of a people who had passed from the soft enervating influences of a southern climate to the stern rigours of the north, where man lived in constant warfare with the elements and with his fellow-men. According to Snorri Sturlesson (q. v.), whose opinion seems to a certain extent to have been a mere re-echo of the traditional belief of his forefathers, Odin and his sons and companions were earthly kings and priests of a sacerdotal caste, who had migrated from Asia —perhaps, as some conjectured, from Troy—and who conquered and ruled over various parts of Scandinavia and Northern Germany, where after their death they were regarded by the people as deities. In conjunction with this mode of representation, the mythic tales of the warfare of the gods with giants, their intercourse with dwarfs, and spirits of the air and water, and their wanderings on earth, are interpreted as memorials of real war with pre-existing races, and of the spread of Odin's religion from its chief seat in Sweden over the neighbouring countries. This theory explains only a few of the myths; while some, as we have already observed, may be referred to traces of an older faith, which lingered amongst the Finns and Lapps after the advance of the more civilised conquering races had driven those tribes from the southern districts of Scandinavia, which they originally occupied, to the barren recesses of the north.

The worship of the gods was celebrated either in spacious temples, of which there were many in different parts of Scandinavia, or on stone heaps or altars, known as *horg*. These altars were always near some well, and close to a sacred grove, or a solitary tree, on which the votive offerings were suspended, after they had been washed at the neighbouring spring by the attendant priestesses, known as *horgabrudar*. Human sacrifices, although never resorted to on ordinary occasions, were not uncommon in times of public calamity, arising from war, failure of crops, disease, &c.; and the horse, whose flesh was highly esteemed, was a frequent victim, while the fruits of the earth and spoils of war were the usual offerings. Three great festivals were held every year, the first of which was celebrated at the new year in the Yule month, when Thorablot, or the sacrifice of Thorri, an ancient god of the Finns and Lapps, was offered. On these occasions, offerings were made to Odin for success in war, and to Frey for a fruitful year, the chief victim being a hog, which was sacred to the latter god, on the assumption that swine first taught mankind to plough the earth. Feastings and Yule games occupied the whole of the month, whence it was also called the Merry Month. The second festival was in mid-winter, and the third in spring, when Odin was chiefly invoked for prosperity and victory on the Vikings, or sea-roving expeditions which were then entered upon. On the introduction of Christianity, the people were the more ready to conform to the great church festivals of Christmas and Easter, from the fact of their corresponding with the ancient national sacrificial feasts; and so deep-rooted was the adhesion to the faith of Odin in the north, that the early Christian teachers, unable to eradicate the old ideas, were driven to the expedient of trying to give them a colouring of Christianity. Thus the black elves, giants, evil subterranean sprites, and dwarfs, with which the Northmen peopled earth, air, and water, were declared by them to be fallen angels or devils, and under the latter character suffered to retain their old denominations. Belief in these imaginary beings survived the spread of the Reformation, and can scarcely be said to have died out in Scandinavian lands among the superstitious and ignorant, while among the more enlightened the myths connected with them are still related, and serve to give a poetic interest to special localities.

Our own association with the Scandinavian mythology is perpetuated in numerous superstitions and usages still lingering amongst us, and in the names of the days of the week. See WEEK.

The best northern authorities on Scandinavian mythology are N. M. Petersen, *Danmarks Historie i Hedenold* (1837); Rask, in his edition of *Sæmund's Edda;* Jakob Grimm, *Deutsche Mythologie;* Faye, *Norske- Folke- Sang;* Thorpe, *Northern Mythology* (Lond. 1851).

SCANSO'RES. See CLIMBERS.

SCANTLING, the sectional breadth and thickness of timbers for roofs, floors, &c. The term is

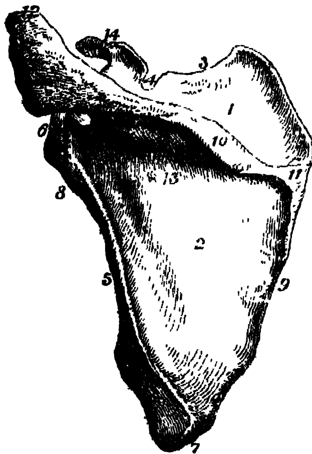
also applied to quarterings or pieces of timber of about five inches in thickness and under.

SCA'PHOID BONE (Gr. *skaphe*, a boat), a term applied to two somewhat boat-like bones, of which one occurs in the carpus or wrist (see HAND), and the other in the tarsus of the Foot (q. v.).

SCAPPLE, a kind of work applied to masonry. To scapple a stone, is to work the surface even without making it smooth.

SCA'PULA, THE, or SHOULDER BLADE, is a flat triangular bone, which, when the arm hangs loosely down, extends posteriorly and laterally from the first to about the seventh rib. It presents for examination an outer convex and an inner, smooth, and concave surface, three borders (a superior, an inferior or axillary, and a posterior), three angles, and certain outstanding processes.

The figure represents an outer or posterior view of the scapula. It is divided into two unequal



A Posterior View of the Left Scapula:

The parts designated by the figures 1, 2, 4, 6, 8, 10, 11, 12 are sufficiently described in the text; 3 is the superior border; 5, the anterior or axillary border; 7, the inferior angle; 9, the posterior border or base; 13, one of the nutritious foramina; 14, the coracoid process. (From Wilson's *Anatomist's Vade Mecum.*)

parts, the supra-spinous fossa (1), and the infra-spinous fossa (2), by the spine (10), a crest of bone commencing at a smooth triangular surface (11) on the posterior border, and running across towards the upper part of the neck of the scapula (8), after which it alters its direction, and projects forwards so as to form a lofty arch, known as the acromion process (12), which overhangs the glenoid cavity (6), or receptacle for the head of the humerus, or main bone of the arm. This acromion (so called from the Greek words *acros ōmos*, the summit of the shoulder) obviously serves to protect the shoulder joint, as well as to give great leverage to the deltoid muscle which raises the arm. It is this process which gives to the shoulder its natural roundness. From the upper part of the neck (8) there proceeds a remarkable curved projection termed the coracoid process, from its supposed resemblance to the beak of a raven (Gr. *kōrax*). It is about two inches long, and gives attachments to several muscles. The upper border of the scapula presents a very remarkable notch (4), which in the recent state is bridged over with a ligament, and gives passage to the supra-scapular nerve. This bone articulates with the clavicle and humerus, and gives attachment to no less than 16 muscles, many of which, as the biceps, triceps, deltoid, serratus magnus, are very powerful and important.

The uses of this bone may be stated as follows: 1. It connects the upper extremity to the trunk, and participates in, and is subservient to many of the movements enjoyed by the arm; 2. By its extended flat surface it furnishes a lateral protection to the chest; and 3. It affords attachments to various muscles which modify the size of the thoracic cavity, and is thus concerned in the process of respiration.

SCA'PULAR, or SCAPULARY (Lat. *scapula*, the shoulder), a portion of the monastic habit, so called from its being worn upon the shoulders. It consists of a long stripe of serge or stuff, the centre of which passes over the head, one flap hanging down in front, the other upon the back. The scapular of the professed monks in most orders reaches to the feet, that of the lay brothers only to the knees. The colour differs for different religious orders or congregations. Besides the scapular worn by the members of religious orders strictly so called, there exists also in the Roman Catholic Church a religious association or confraternity, the members of which, while living in the world and mixing in ordinary life, wear, although not conspicuously, a small religious emblem called a scapular. The chief duties of this confraternity consist in the recitation of certain prayers, or the observance of certain religious or ascetical exercises through devotion to the Blessed Virgin. The members may or may not bind themselves by a vow of chastity. This pious association was founded in the middle of the 13th c. by an English Carmelite friar named Simon Stock, and is said to have originated in a vision, which has been the subject of much controversy, as well with Protestants as among Catholics themselves.

SCARABÆ'IDÆ, a very numerous tribe of lamellicorn coleopterous insects (see LAMELLICORNES), of which more than 3000 species are known, the greater number inhabitants of tropical countries, although species are found in almost all parts of the world. Some of the tropical species are amongst the largest of beetles; those found in colder regions, as in Britain, are of comparatively small size. The tribe is divided into six sections: *Coprophagi* (dung-eaters), *Arenicoli* (dwellers in sand), *Xylophili* (delighting in wood), *Phyllophagi* (leaf-eaters), *Anthobii* (living on flowers), and *Melitophili* (delighting in honey), named according to prevalent and characteristic habits of the species belonging to them, although the names do not accurately denote the habits of all the species of each section. The sections are distinguished by differences in the organs of the mouth and the antennæ. To the section *Crotophagi* belong the greater number of the Dung Beetles (q. v.), or Scavenger Beetles, so useful in warm countries in removing offensive matter; amongst which is the Sacred *Scarabæus* of the ancient Egyptians (*Scarabæus*, or *Ateuchus sacer*). Some of the *Xylophili*, as the great Hercules Beetle (q. v.), have remarkable projections from the head or the thorax of the males. The Cockchafer (q. v.) is an example of the *Phyllophagi*; the Goliath Beetle (q. v.) is one of the *Melitophili*, to which section the Rose Beetle, common in Britain, also belongs. None of the *Anthobii* are British.

SCARABÆ'US, the name of a beetle held sacred by the Egyptians, commonly known in entomology as the *Scarabæus* or *Ateuchus sacer*. It was called *Heliocantharus* or *Cantharus*, by the Greeks, and

S. by the Latins. Scarabæi were employed for rings, necklaces, and other purposes by the Egyptians, Phœnicians, and Etruscans (see GEMS). These are principally distinguished by the absence or presence of striated elytra and other marks. Entomologists have recognised four distinct species of the *Ateuchus* on the Egyptian monuments, viz., *A. semipunctatus*, *A. laticollis*, *A. morbillosus*, *A. puncticollis*. Several mystical ideas were attributed to the S.: the number of its toes, 30, symbolised the days of the month, the time it deposited its ball in which its eggs were deposited, was supposed to refer to the lunar month; the movement of the clay-ball referred to the action of the sun on the earth, and personified that luminary. The S. was supposed to be only of the male sex, hence it signified the self-existent, self begotten, generation or metamorphosis, and the male or paternal principle of nature. In this sense it appears on the head of the pygmæan deity, Ptah Sochanis Osiris, the demiurgos, and in astronomical scenes and sepulchral formulas. In the hieroglyphs it is used for the syllable *khepru*, and expresses the verb 'to be, exist.' In connection with Egyptian notions, the Gnostics and some of the Fathers called Christ the scarabæus. The insect, during its life, was worshipped, and after death, embalmed.—*Horapollo*, i. c. 10; Ælian, *De Nat. Anim.* x. 15; Pettigrew, *History of Mummies*, p. 221; Wilkinson, *Man. and Cust.* v. p. 255.



Scarabæus.

SCA'RAMOUCH (Ital. *scaramuccia*, skirmish), a character in the old Italian comedy, originally derived from Spain, representing a military poltroon and braggadocio. He was dressed in a sort of Hispano-Neapolitan costume, including a black *toque* and mantle, and a mask open on the forehead, cheeks, and chin, and always received an inglorious drubbing at the hands of harlequin.

SCA'RBOROUGH (i.e., fortified rock), a seaport and municipal and parliamentary borough in Yorkshire, in the East Riding, 42 miles north-east of York, and about 20 miles north-west of Flamborough Head. It is built around a charming bay open to the south and south-west, and protected on the north-east by a promontory ending in a castle-crowned height, which looks out on the North Sea. From the sands the town has gradually climbed the rising ground behind in successive terraces and crescents. The chief buildings are churches, chapels, and benevolent and other institutions, with which the town is well furnished. A fine cast-iron bridge, 75 feet high, and stretching over a chasm 400 feet wide, connects the old and new towns, and leads to the spa, and a bridge has recently (1865) been erected over a picturesque ravine to connect the western part of the town with its large and fashionable southern suburb. The springs, which are saline and chalybeate, are on the margin of the sea, and are surrounded by walks and ornamental grounds. The harbour, composed of three piers, and furnished with a light-house, is the most important in this part of the east coast. Every accommodation is offered to visitors for sea-bathing, and S. is reputed the most fashionable watering-place on the north-east coast. The season lasts from June to the middle of October. In 1863, 407 vessels, of 22,349 tons, entered and cleared the port. Pop. (1861) 18,377. The castle was erected about the year 1136. It was held against the barons by Piers Gaveston, who, however, surrendered, and was afterwards beheaded. It was twice besieged by the parliamentary forces. At present, it serves as a barrack, and is fortified by batteries.

SCA'RCEMENT, a plain set-off or projection in a wall; foundations have generally one or more scarcements.

SCARF, in Heraldry, a small ecclesiastical banner suspended from the top of a crozier.

SCA'RFING, the junction of two pieces of timber made to overlap, and united so as to appear as one piece.

SCARLATI'NA, or SCARLET FEVER, is one of the group of diseases called Exanthemata (q. v.). In addition to the characters common to the group, scarlatina is almost always attended by sore throat, and the rash or eruption, which is of bright scarlet colour, commonly appears as early as the second day after the manifestation of the febrile symptoms, and ends in desquamation of the cuticle on the sixth or seventh day. Most writers on medicine make three varieties of this disease—viz., *S. simplex*, in which there are the fever and the rash, but scarcely any throat-affection; *S. anginosa*, in which, in addition to the fever and the rash, the throat-affection is the most prominent symptom; and *S. maligna*, a name which is applied to certain cases of extreme violence, in which the system is at once overwhelmed by the force of the disease, or in which the symptoms evince an extraordinary degree of weakness and want of vital power.

The disease begins with shivering, lassitude, headache, a frequent pulse, a hot dry skin, a flushed face, thirst, loss of appetite, and a furred tongue. Shortly after the appearance of the febrile symptoms, the throat begins to feel irritable, and, on examination, is found to be red, and often more or less swollen. This redness becomes diffused over the interior of the mouth, and the tongue. The rash begins in the form of minute red points, which soon become so numerous that the surface appears of an almost uniform red. It first appears on the neck, face, and breast, whence it gradually spreads over the trunk and extremities. The reddened surface is smooth to the touch, and the colour temporarily disappears on pressure of the finger. Along with the true rash, minute vesicles, known as *Sudamina* (q. v.), sometimes occur. The eruption, in ordinary cases, is persistent for three or four days, after which it gradually disappears, and is usually gone by the end of the seventh day. The cuticle then begins to scale off in small bran-like scurf, or in flakes of various sizes. Specimens of an almost entire epidermic covering of the hand or foot, forming a natural glove or slipper, are of common occurrence in our pathological museums; but it is comparatively seldom that such perfect moulting takes place. The desquamative process is usually completed in a fortnight, or rather more, from the commencement of the disease. The fever does not abate on the appearance of the rash, but continues in a more or less decided degree through the progress of the case; it often presents exacerbations towards the evening, and is occasionally attended with delirium, or even with comatose symptoms. If the urine be examined, both chemically and microscopically, a few days after desquamation has set in, it will be found to contain albumen, and to exhibit a large amount of epithelium from the uriniferous ducts of the Kidneys (q. v.).

Malignant Scarlatina is so terrible a disease that its characteristic symptoms require a brief special notice. The rash comes out late and imperfectly, and sometimes is hardly perceptible; or, having appeared, it may suddenly recede; and sometimes it is intermixed with livid spots. The

pulse is feeble, the skin is cold, and there is extreme prostration of strength. In such a case as this, death may occur (apparently from blood-poisoning) in a few hours. Other cases rapidly assume a typhus-like character. 'The pulse (says Dr Watson) becomes frequent and feeble; the tongue dry, brown, and tremulous; the debility extreme; the breath offensive the throat is livid, swollen, ulcerated, and gangrenous; and the respiration is impeded by viscid mucus, which collects about the fauces. Over this variety of the disease, medicine has comparatively little control.'

Even in *S. anginosa*, there is very considerable danger. The disease may prove fatal (1) from inflammation or effusion within the head, or (2) from the throat-affection, which too often proceeds to disorganisation and sloughing of the adjacent parts. Moreover, in parturient women, even the mildest form of the disease is fraught with the greatest peril. Further, when the disease is apparently cured, the patient is exposed to great hazard from its consequences or *sequelæ*. Children who have suffered a severe attack of scarlet fever are liable (in the words of the eminent physician to whom we have already referred) 'to fall into a state of permanent bad health, and to become a prey to some of the many chronic forms of scrofula—boils, strumous ulcers, diseases of the scalp, sores behind the ear, scrofulous swellings of the cervical glands and of the upper lip, chronic inflammation of the eyes and eyelids. The above-named consequences not unfrequently follow small-pox and measles, but, in addition to these, scarlatina is often followed by the form of dropsy known as *anasarca*, or serous infiltration of the subcutaneous cellular tissue, frequently accompanied with dropsy of the larger serous cavities. Strange as it may at first sight appear, this dropsy is much more common after a mild than after a severe form of the disease; but this apparent anomaly is probably due to the fact, that less caution is observed in the former than in the latter cases during the dangerous period of desquamation. If the patient (for example) is allowed to go out while new cuticle is still forming, the perspiratory power of the skin is checked by the cold, and the escape of the fever poison through the great cutaneous outlet is thus prevented. An excess of the poison is therefore di . n . the kidneys, where it gives rise to the form of renal disease known as 'acute desquamative nephritis.'

Scarlatina is a disease that like all the exanthemata—occurs in the epidemic form; and each epidemic presents its peculiar type, the disease being sometimes uniformly mild, and in others almost as uniformly severe. The treatment of this disease varies according to the preponderating symptoms. In *S. simplex*, nothing is required except confinement to the house, a non-stimulating diet, and the due regulation of the bowels, which are apt to be costive. In *S. anginosa*, cold or tepid sponging gives much relief if the skin is hot. If there is much fever, and especially if delirium supervene, a few leeches should be applied behind the ears, or if the patient were previously in robust health, blood might be cautiously taken from the arm. If, however, no bad head-symptoms are present, all that is necessary is to prescribe saline draughts, of which citrate of ammonia, with a slight excess of carbonate of ammonia, forms the best ingredient, and to keep the bowels open once or twice a day by gentle laxatives. In *S. maligna*, there are two main sources of danger, which were first recognised as distinct by Dr Watson, who describes them as follows: 'The one arises from the primary impression of the contagious poison upon the body, and particularly upon the nervous system, which is overwhelmed by its influence. The patients sink often at a very early period, with but little affection either of the throat or skin. If we can save such patients at all, it must be by the liberal administration of wine and bark, to sustain the flagging powers until the deadly agency of the poison has in some measure passed away. But another source of danger arises from the gangrenous ulceration which is apt to ensue in the fauces, when the patient is not killed by the first violence of the contagion. The system is re-inoculated, I believe, with the poisonous matter from the throat Now, under these circumstances also, quina, or wine, and upon the whole, I should give the preference to wine, is to be diligently though watchfully given.' In addition to these remedies, a weak solution of chloride of soda, of nitrate of silver, or of Condy's disinfectant fluid, should be used as a gargle or if, as is too often the case, the patient is incapable of gargling, the solution may be injected into the nostrils and against the fauces by means of a syringe or elastic bottle.

Three medicines have been so highly commended in scarlet fever generally, by trustworthy observers, that it is expedient to notice them. The first is chlorate of potash (KO,ClO_5) dissolved in water in the proportion of a drachm to a pint. A pint, or a pint and a half, may be taken daily. It was originally prescribed under the idea that it gave off its oxygen to the blood, and was eliminated from the system as chloride of potassium (KCl). Although this view is now known to be incorrect, there is no doubt that the salt is often prescribed with great benefit in this and some other diseases, as, for example, diphtheria and typhus fever. The second medicine is a very weak, watery solution of chlorine, of which a pint may be taken in the day; and the third is carbonate of ammonia in five-grain doses three times a day, given in beef-tea, wine, &c.

In the early sta , before the appearance of the rash, scarlatina may be readily mistaken for several other febrile diseases; after the appearance of the rash, the only disease for which it can be mistaken is measles, and we must refer to the article on that disease for a notice of the distinctive characters of the two affections.

There is no complaint in which the final result is more uncertain than this, and the physician should give a very guarded opinion as to how any special case may terminate.

Whether the disease is contagious throughout its course, or only at one particular period, is unknown; and if the physician is asked at what period the danger of imparting the disease on the one hand, or catching it on the other, is over, he should candidly declare that he does not know. That the contagion remains attached to furniture, clothing, &c., for a long period is undoubted. Dr Watson gives a remarkable instance of a small piece of infected flannel communicating the disease after the interval of a year.

The popular delusion that *scarlatina* is a mild and diminutive form of *scarlet fever* should always be corrected, as the error, if uncorrected, may do much harm by leading to a disregard of those precautions which are always necessary in this disease.

SCARLATTI, ALESSANDRO, a musician of great eminence, born at Trapani in Sicily in 1659. He is said to have studied under Carissimi; if so, it must have been when very young. In 1680, S. visited Rome, and composed his first opera, *L'onestà nell' amore*, first performed at the court of Queen Christina of Sweden. His opera, *Pompeo*, was performed at Naples in 1684. In 1693, he composed the oratorio, *I Dolori di Maria sempre Vergine*, and

the opera *Teodora*, in which orchestral accompaniments were first introduced to the recitatives, and a separate design given to the accompaniments to the airs. In the following eight years, during part of which time he held the office of *maestro di capella* at Naples, he produced various operas, the most remarkable being *Laodicea e Berenice*, composed in 1701. Between 1703—1709 he held the situation of *maestro di capella* at St Maria Maggiore at Rome; he then returned to Naples; and in 1715, produced *Il Tigrane*. Alessandro S. died in 1721. His musical works comprise 117 operas, several oratorios, and a great deal of church music, besides various madrigals and other chamber music. He was the founder of the Neapolitan school, in which were trained most of the great musicians of last century, and whose influence can be traced in the works of almost every composer who has flourished since. His invention was rich and bold, his learning great, and his style pure. His modulations, often unexpected, are never harsh, and never difficult for the voice. His son, DOMENICO (born 1685, died 1757), was the first harpsichord player of his day. Among his compositions are a number of sonatas, remarkable for invention, graceful melody, and skilful construction.—Domenico S. had a son, GIUSEPPE (born 1718, died 1796), who was also known as an eminent musician.

SCARLET COLOURS. Cochineal furnishes the only scarlet colour generally employed in dyeing, and for this purpose it is very extensively used; a solution of tin and cream of tartar is employed as the mordant to fix it. Scheffer, who produced the best formula for dyeing this colour, also added starch, the proportions being as follow: Starch, 9 lbs.; cream of tartar, 9 lbs. 6 oz.; solution of tin, 9 lbs. 6 oz.; and cochineal, 12 lbs. 4 oz. These are the quantities required for 100 lbs. of wool or cloth.

SCARLET RUNNER. See KIDNEY BEAN.

SCARP. See ESCARP.

SCARPA, ANTONIO, a celebrated anatomist, was born on 13th June 1747, at Casello-Motta, a village in the Friuli. He was educated at Padua, where his ardour attracted the attention of the octogenarian Morgagni, who, having lost his sight shortly after the arrival of S. at the university, engaged the young enthusiast as his secretary, and dictated to him in Latin the answers which he made to letters soliciting his advice. The intervals between their medical studies were employed by Morgagni and S. in the perusal of the Latin authors, and it is to this practice that we must ascribe the elegance that distinguished the scientific style of S. in his subsequent publications. In 1772, he was appointed Professor of Anatomy in Modena. He afterwards visited France, Holland, and England; and while in London, was so enamoured of John Hunter's Museum, that he did not rest until he had constructed a similar one at home. In 1783, he filled the anatomical chair at Pavia. He made, in the following year, a journey throughout the greater part of Germany, and in the course of it acquired the experience that made him one of the greatest clinical surgeons in Europe. On his return to Pavia, he published in rapid succession treatises on the anatomy of the Organs of Smell and Hearing; on the Nerves of the Heart, and on the minute anatomy of Bone. These, especially that on the innervation of the heart, which settled the question whether that viscus was supplied with nerves, gave S. a European reputation. His work on the Diseases of the Eye, published in 1801, was followed in 1804 by his observations on the Cure of Aneurism. But his greatest achievement was his work on Hernia, published in 1809. His reputation was now at its highest; but three years afterwards, he had to give up the work of public teaching, and entered, in 1814, on the office of Director of the Medical Faculty of Pavia. His next publication was some valuable observations on the operation for Stone. For the last years of his life, he suffered from almost total blindness, until, on the 30th of October 1832, he died at Pavia, of inflammation of the bladder. S.'s merits as an observer, a teacher, and a writer were very great. Industrious, scholarly, artistic, he appeared to great advantage in nearly every subject he undertook.

SCARPA'NTO (anc. *Carpathos*), an island in the Mediterranean, belonging to Turkey, midway between the islands of Rhodes and Crete. It is 32 miles long, and about 8 miles in extreme breadth, and its surface is covered with bare mountains, which reach the height of 4000 feet. The ruins of towns, which are found in several places, seem to indicate that formerly the island was well peopled. At present, the inhabitants are only about 5000 in number, and are mostly employed as carpenters and workers in wood, a trade of which they seem peculiarly fond, and in commerce.

SCARPE, in Heraldry, a diminutive of the bend sinister, being half the breadth of that ordinary.

SCARRON, PAUL, the creator of French burlesque, was born at Paris in 1610. His father, a counsellor of parliament, was a man of fortune and good family; but he having married again after the death of Paul's mother, discord broke out between the second wife and her step-children, the result of which was that Paul had to leave the house. About 1634, he visited Italy, where he made the acquaintance of Poussin the painter. On his return to Paris, he delivered himself over to a life of very gross pleasure, the consequence of which was that, in less than four years, he was seized with permanent paralysis of the limbs. What makes this incident in his career still interesting is the fact, that it undoubtedly exercised no inconsiderable influence on the development of his peculiar genius, which, as a French critic justly says, was 'the image of his body.' His love of burlesque, of malicious buffoonery, of profane gaiety, was simply a way of escape through the gates of mockery from the *tourmens véhémens* of his incurable ailment. His scramble for the means of living is excusable when we consider his hapless infirmity. He wrote verses, flattering dedications, begging-letters for pensions, &c.; and in 1643 he even managed to get a benefice at Mans, which he held for three years, when he returned to Paris, and lived in a sort of elegant Bohemian style. He had a pension from Mazarin of 500 crowns; but when the cardinal declined (probably from avarice) to allow the *Typhon* to be dedicated to him, S. got absurdly indignant, and joining the Frondeurs, lampooned Mazarin with spleenful virulence. However, when the war of the Fronde was at an end, and Mazarin had triumphed, S. was ready with an ode to

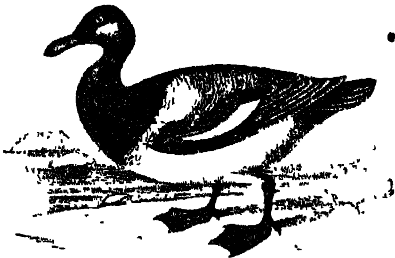
Jule, autrefois l'objet de l'injuste satire.

This baseness, however, did not win him back his pension, which the 'object of his unjust satire' had withdrawn; and it might have fared hard with the poet, had other friends not started up—for example, Fouquet, who granted him a pension of 1600 crowns—and had he himself not been the most consummate beggar that ever lived. If he could not get a benefice or a purse of gold, or a lodge at court, he would take a load of firewood, or a carriage, pasties, capon, cheese, poodles, &c.—nothing came amiss; and his ample acknowledgments shewed how thoroughly he had mastered

the art of expressing gratitude. Doubtless his physical helplessness induced this bad habit, but his importunities were so pleasantly worded that they never estranged the friends on whom he fastened. In 1652, S. married Françoise d'Aubigné—a girl of 17, who subsequently became the mistress of Louis XIV., and is known as Madame Maintenon (q. v.). He died early in October 1660—the exact date is not known, but he was buried on the 7th. It is a proof of the charm of his company that his rooms were frequented by most of the men and women of his day who were distinguished either in literature or society. Among his works may be mentioned *Le Typhon, Virgile Travesti* (Par. 1648—1652), *La Mazarinade* (1649), *La Baronade Léandre et Héro, Ode Burlesque, La Relation du Combat des Parques et des Poetes sur la Mort de Voiture, Poésies Diverses* (Par. 1643—1651), comprising sonnets, madrigals, epistles, satires, songs, &c.; *Le Roman Comique* (Par. 1651), a most amusing account of the life led by a company of strolling players—it is the best known, and perhaps the best of all S.'s productions; *Nouvelles Tragi-comiques*, from one of which (*Les Hypocrites*) Molière has taken the idea of Tartufe; besides a number of clever but coarse comedies. The editions of his works are very numerous, but the best is that of Bruzen de la Martinière (Amster., 10 vols., 1737; Par., 7 vols. 1786). Victor Fournel, to whom we are indebted for most of the information in this article, republished *Le Roman Comique*, in 1857, and *Le Virgile Travesti* in 1858.

SCATTERY ISLAND, a small islet in the estuary of the Shannon, three miles south-west of the town of Kilrush. Besides a fort, the islet contains fragments of several small churches, and an ancient round tower 120 feet high.

SCAUP DUCK (*Fuligula* or *Nyroca—marila*), an oceanic species of duck, of the same genus with the Pochard (q. v.), an inhabitant of the northern parts of the world, spending the summer in arctic or subarctic regions, and visiting the coasts of Britain and of continental Europe as far south as the Mediterranean in winter, when it is also to be seen in great flocks in the United States, not only on the



Scaup Duck (*Fuligula marila*).

sea-coast, but on the Ohio, Mississippi, and other rivers. It breeds in fresh-water swamps. It is nearly equal in size to the Pochard. The male has the head, neck, and upper part of the breast and back black, the cheeks and sides of the neck glossed with rich green; the back white, spotted and striped with black lines; the wing-coverts darker than the back, the speculum white; the rump and tail-coverts black. The female has brown instead of black, and old females have a broad white band around the base of the bill. The flesh of the S. D. is tough, and has a strong fishy flavour.

SCEATTÆ. See NUMISMATICS.

SCENA. See THEATRE.

SCEPTICISM (Gr. *skeptomai*, 'I consider') strictly denotes that condition in which the mind is before it has arrived at conclusive opinions—when it is still in the act of reflecting, examining, or pondering over subjects of thought. Scepticism is therefore the opposite of dogmatism (see DOGMA). The notion of 'disbelief,' is quite a secondary meaning of the term. Among the Greeks a *skeptikos*, 'sceptic,' was originally only a thoughtful person, and the verb *skeptomai*, never acquired any other signification than 'to consider.' But inasmuch as the mass of men rush to conclusions with haste, and assert them with far more positiveness than their knowledge warrants, the discerning few of clearer vision or cooler head, are often brought into collision with popular beliefs—more especially in religion, the sphere in which popular beliefs are most numerous, most positive, and most inconsiderate—and are compelled by the violent shock given to their reason to 'doubt,' it may be to 'disbelieve' what they hear affirmed by the multitude with indefensible emphasis of speech. Thus it is that in common parlance a sceptic has come to mean an infidel, and scepticism infidelity. But the field of thought in which scepticism properly so-called has preferred to exercise itself is not religion but philosophy. Philosophical sceptics in all ages and countries have generally denied or at least doubted the trustworthiness of the senses as vehicles of absolute truth, and so have destroyed the very possibility of speculation. In ancient times, Pyrrhon (q. v.), in modern, David Hume (q. v.), are the most characteristic representatives of this kind of scepticism.

SCEPTRE (Gr. *skēptron*, staff; from *skēpto*, to send or thrust), originally a staff or walking-stick, hence in course of time, also a weapon of assault and of defence. At a very early period the privilege of carrying it came to be connected with the idea of authority and station. Both in the Old Testament and in Homer, the most solemn oaths are sworn by the sceptre, and Homer speaks of the sceptre as an attribute of kings, princes, and leaders of tribes. According to Homer, the sceptre descended from father to son, and might be committed to any one to denote the transfer of authority. Among the Persians, whole classes of persons vested with authority, including eunuchs, were distinguished as the 'sceptre-bearing classes.' The sceptre was in very early times a truncheon pierced with gold or silver nails. Ovid speaks of it as enriched with gems, and made of precious metals or ivory. The sceptre of the kings of Rome, which was afterwards borne by the consuls, was of ivory, and surmounted by an eagle. While no other ensign of sovereignty is of the same antiquity as the sceptre, it has kept its place as a symbol of royal authority through the middle ages and down to the present time. There has been considerable variety in its form; the sceptre of the kings of France of the first race was a gold rod as tall as the king himself.

SCHADOW, GODENHAUS FRIEDR. WILH. VON, a distinguished German painter, of the Dusseldorf school, was born at Berlin, September 6, 1789. His father, Joh. Gottf. S., an eminent sculptor, died director of the Berlin Academy of Arts, in 1850. At first young S. did not give much promise of excellence, but during his first visit to Rome, the influence of Overbeck, Cornelius, Fuhrich, Veit, &c., awoke his dormant genius, and both singly and in company with some of these artists, he executed several pictures remarkable for their

depth of religious sentiment; as 'An Explanation of the Dream of Joseph' and 'The Grief of Jacob when told of the Death of his Son.' While residing in the city of the pope, he passed over to Roman Catholicism. Scarcely had S. returned to Berlin when he was appointed professor of the academy, and soon gathered round him a host of brilliant pupils; but in 1826 he went to Düsseldorf as successor of Cornelius, in the direction of the notable academy there. His pupils followed him, and ever since the 'Düsseldorf School' has been associated specially with their names. S.'s principal works are 'Mignon' (1828); 'The Four Evangelists,' one of the finest productions of German art; 'The Wise and Foolish Virgins,' 'The Source of Life,' 'The Assumption,' three great allegorical pictures; and 'Heaven,' 'Purgatory,' and 'Hell.' S. was ennobled by the king of Prussia in 1843.

SCHAFFHAUSEN, the most northern canton of Switzerland, is bounded on all sides but the south by the duchy of Baden. Area, 117 sq. m.; pop. (1860) 35,964, of whom 33,000 are Protestants, and 2400 are Catholics. The chief river is the Rhine, which forms part of the southern boundary, and within the basin of which the canton is wholly included. The surface is hilly, especially in the north and east, and of the many rich valleys that slope southward to the Rhine, that of the Klettgau is famous for its unusual fertility, and for its wines, the bouquet of which is peculiarly fine. The climate is mild; the soil, which is mostly calcareous, is generally fruitful, and agriculture is the principal branch of industry. Grain, fruits, flax, hemp, and wine are the chief crops. Iron is obtained, but the manufactures are not important. About 20,000 tons of gypsum are obtained yearly at the town of Schleitheim (pop. 2000). The canton is divided into six districts.

SCHAFFHAUSEN, a town of Switzerland, capital of the canton of the same name, beautifully situated on the right bank of the Rhine, immediately above the celebrated falls of that river. Higher up the slope on which the town stands, is the curious castle of Munoth, and this edifice and the minster, founded in 1052, are the chief buildings. The town is remarkable for the antique architecture of its houses. The old wall and gateways of S. are also very picturesque. Pop. 7770, who are partly engaged in the manufacture of iron, cotton, and silk goods. The *Falls of Schaffhausen*, about three miles below the town, form, perhaps, the most imposing spectacle of the kind in Europe. The river is here 300 feet broad, and the entire descent is about 100 feet. From a projecting balcony which overhangs the roaring cataract, the visitor may appreciate the full grandeur of the fall.

SCHALL, JOHANN ADAM VON, a celebrated Jesuit missionary to China, was born of noble family at Cologne in 1591, and having made his studies and entered the Jesuit order in Rome, in 1611, he was selected, partly in consequence of his great knowledge of mathematics and astronomy, to form one of the mission to China in 1620. Having, with the characteristic skill and ability of his order, turned to good account among the Chinese his familiarity with mathematical and mechanical science, he not only succeeded in forming a flourishing mission, but was ultimately invited to the imperial court at Pekin, where he was entrusted with the compilation of the calendar, and the direction of the public mathematical school, being himself created a mandarin. Such was his favour with the emperor, that, contrary to all the received etiquette, he had the privilege of free access to the presence of the Emperor Chun-Tche, the founder of the Tartar dynasty (1645), and was honoured by visits from the emperor at four stated times in each year. Through this favour with the emperor, S. obtained an edict which authorised the building of Catholic churches, and the liberty of preaching throughout the empire; and in the space of 14 years the Jesuit missionaries in the several provinces are said to have received into the church 100,000 proselytes. On the death of this emperor, however, a change of policy fatal to the prospects of Christianity took place. The favourable edict above referred to was revoked; S. was thrown into prison and sentenced to death. He was afterwards liberated; but he was again imprisoned, and, at the end of a long incarceration, died August 15, 1669. He had acquired a perfect mastery of the Chinese language, in which he compiled numerous treatises upon scientific and religious subjects. A large MS. collection of his remains in Chinese, amounting to 14 volumes in 4to, is preserved in the Vatican Library. He also translated into Chinese several works, doctrinal and medical, especially some treatises of Father Lessius, a Flemish Jesuit, the most important of which was that *On the Providence of God*.—See Mailly's *Histoire Générale de la Chine* and Huc's *Le Christianisme en Chine*.

SCHÄSBURG, or SCHÄSSBURG (Magyar, *Segesvár*), a town of Austria, in Transylvania, on the great Kokel. It consists of the Burg or Upper-Town and the Lower-Town. Pop. 7962.

SCHAUMBURG-LIPPE, a sovereign German principality, includes the western part of the former county of Schaumburg, and is bounded on the W. by Westphalia, and the N. by Hanover. Area, 170 sq. m.; pop. (1861) 30,774. It shares the physical characters of the surrounding states. The prince, who resides for the most part at Bückeburg (pop. 4219), has large possessions in Mecklenburg, Hanover, and Bohemia. The public revenue amounts to 228,000 thalers, and the expenses to the same sum. It has one vote in the *plenum*, and part of the 16th vote in the *curia*. It contributes to the force of the Germanic Confederation a contingent of 516 men. The line of S.-L., a branch of the House of Lippe (q. v.), split off from the main stem in the year 1613.

SCHEELE, CHARLES-WILLIAM, an eminent Swedish chemist, was born at Stralsund, 1742, and after receiving a brief and incomplete education, was apprenticed to an apothecary at Gothenburg, where he laid the foundation of his knowledge of chemistry. In 1767, he settled at Stockholm as an apothecary; and in 1770, removed to Upsala, where at that time the celebrated Bergmann was professor of chemistry. It was during his residence at Upsala that he carried on those investigations in chemical analysis which proved so fruitful in important and brilliant discoveries, and placed their author by the side of Linnæus and Berzelius, his countrymen—in the front rank of science. In 1777, he removed to Köping to take possession of a vacant apothecary business, but died of ague-fever, 24th May 1786, at a time when he was receiving the most tempting offers from England to persuade him to settle in that country. The chief of his discoveries were tartaric acid (1770), chlorine (1774), baryta (1774), oxygen (1777), and glycerine (1784) the second-last of which had been previously made known through the labours of Priestley, though S. was not aware of this till after his own discovery of it in 1777. In experimenting on arsenic and its acid, he discovered the arsenite of copper, which is known as a pigment under the name of *Scheele's Green* or *Mineral Green*. In 1782, during an eminently delicate and subtle investigation to determine

the nature of the colouring-matter in Prussian Blue, he succeeded in obtaining, for the first time, prussic acid in a separate form. The mode and results of his various investigations were communicated from time to time, in the form of memoirs, to the Academy of Stockholm, of which he was an associate, and also in his chief work, the *Chemical Treatise on Air and Fire* (Upsala, 1777), and in an *Essay on the Colouring Matter in Prussian Blue* (1782).

SCHEELE'S GREEN. See ARSENIOUS ACID.

SCHEFFER, ARY, a French painter, born at Dort, in Holland, 10th February 1795, studied under Guerin of Paris, and made his début as an artist in 1812. Some years later appeared his 'Mort de Saint-Louis,' 'Le Dévouement des Bourgeois de Calais,' and several *genre* pieces, such as 'La Veuve du Soldat,' 'Le Retour du Conscrit,' 'La Sœur de Charité,' 'La Scène d'Invasion,' &c., which have been popularised in France by engravings; but compared with his later performances, these early pictures have little merit. It was not till the 'Romantic' movement reached art that S. began to feel conscious of his peculiar power. The influence of Goethe and Byron became conspicuous in his choice of subjects, and to the remarkable facility of execution that had always marked him, he now added a subtilty and grace of imagination, that gave an inexpressible charm to his works. The public admired his new style greatly, and lavished eulogy with liberal hand on his 'Marguerite à son Rouet,' 'Faust tourmenté par le Doute,' 'Marguerite à l'Eglise,' 'Marguerite au Sabbat,' 'Marguerite sortant de l'Eglise,' 'Marguerite au Jardin,' 'Marguerite à la Fontaine,' 'Les Mignons,' 'Le Larmoyeur,' 'Francesca de Rimini,' &c. Towards the year 1836, his art underwent its third and final phase—the religious. To this class belong his 'Le Christ Consolateur,' 'Le Christ Rémunérateur,' 'Les Bergers conduits par l'Ange,' 'Les Rois Mages deposant leurs Trésors,' 'Le Christ au Jardin des Oliviers,' 'Le Christ portant sa Croix,' 'Le Christ enseveli,' and 'Saint Augustin et sa Mère Sainte Monique,' some of which are well known in England by engravings. S. also executed some remarkable portraits; among others, those of La Fayette, Beranger, Lamartine. He died at Argenteuil, near Paris, 15th June 1858.

SCHELDT, THE (pron. *Skelt*; Lat. *Scaldis*, Fr. *l'Escaut*), rises in the French dep. of Aisne, flows northerly to Cambrai, Valenciennes, Bouchain, and Condé, when entering Belgium, it passes Doornik, Oudenarde, Ghent, Dendermonde, Rupelmonde, and Antwerp, having received, among other tributaries, the Lys, Dender, and Rupel. Navigable from its entrance into Belgium, the S. at Antwerp becomes a noble river, of sufficient depth for large ships. From Antwerp, the course is north-west, to Fort Bath, in the Netherlands, where, coming in contact with the island of South Beveland, it divides into two arms. The left or southern, called the Honte or Wester S., takes a westerly direction, south of the islands of Zeeland, and meets the North Sea at Flushing; the northern or right arm, called the Kreekerak, flows between Zeeland and North Brabant, near Bergen-op-zoom, dividing again into two branches, the left, called the Easter S., passing between the islands of Tholen and Schouwen on the right, and the Bevelands on the left, reaches the sea through the Roompot (*Romanorum portus*); the other branch, flowing between North Brabant and Zeeland, discharges itself by several passages. These several mouths of the S., forming various islands, are called the Zeeland streams.

The Dutch had long monopolised the navigation of the lower S.; and by the treaty signed in London (April 19, 1839), the Netherlands secured the right of levying 2*s*. 6*d*. per ton on all vessels. By a treaty signed at Brussels, July 16, 1863, this toll has been bought up, nominally by Belgium, but in reality from a sum of £750,000 paid to that country by the powers whose ships navigate the S., the proportion falling to Great Britain being fully £350,000.

SCHELLENBERG, a village in the south-east of Upper Bavaria, six miles south-west of the Austrian town of Salzburg, near which occurred the first battle of the 'War of the Spanish Succession,' in which the English took part. Maximilian-Emmanuel, elector of Bavaria, had fortified the hill of S. to resist the progress of Marlborough; but on July 4th, 1704, the work was attacked by the English, led on by Prince Ludwig of Baden, and carried by storm after a bloody fight.

SCHELLING, FRIEDR. WILH. JOS. VON, an illustrious German philosopher, was born at Leonberg, in Würtemburg, January 27, 1775, studied at Tübingen and Leipzig, and in 1798 proceeded to Jena, then the headquarters of speculative activity in Germany, through the influence of Reinhold and Fichte. S.'s philosophical tendencies were originally determined by Fichte; in fact, he was at first only an expounder, though an eloquent and independent one, of the Fichtian idealism, as one may see from his earliest speculative writings, *Uber die Moglichkeit einer Form der Philosophie* (On the possibility of a Form of Philosophy, Tüb. 1795), *Vom Ich als Princip der Philosophie* (Of the Ego as the Principle of Philosophy, Tüb. 1795), and others. Gradually, however S. diverged from his teacher, and commenced what is regarded as the second phase of his philosophy. Fichte's idealism now seemed to him one sided and imperfect through its rigorous and exclusive subjectivity, and he sought to harmonise and complete it. The result of his speculations, in this direction, was the once famous *Identitatsphilosophie* (Philosophy of Identity), which claimed to shew that the only true knowledge, and, therefore, the only philosophy, was that of the Infinite absolute, in which the 'real' and 'ideal,' 'nature' and 'spirit,' 'subject' and 'object,' are recognised as absolutely the same; and which affirmed the possibility of our attaining to such knowledge by a mysterious process, known as 'Intellectual Intuition.' The 'philosophy of identity,' though only the second stage in S.'s speculative career, is the most important, and is the one by which he is best known in England—Sir William Hamilton having elaborately discussed it, and endeavoured to demonstrate its untenableness in his essay on the 'Philosophy of the Conditioned' (see *Discussions in Philosophy and Literature, Education and University Reform*, 1852). The principal works in which it is more or less completely developed, are *Ideen zu einer Philosophie der Natur* (Ideas towards a Philosophy of Nature, Leips. 1797, 2d ed. 1803); *Von der Weltseele, eine Hypothese der Hohern Physik zur Erlauterung des allgemeinen Organismus* (Of the World-soul, an Hypothesis of the higher Physics in elucidation of the Universal Organism, Hamb. 1798, 3d ed. 1809); *Erste Entwurf eines Systems der Naturphilosophie* (First Attempt at a Systematic Philosophy of Nature, Jena, 1799); and *System des Transcendentalen Idealismus* (System of Transcendental Idealism, Tüb. 1800). In 1803, after the departure of Fichte from Jena, S. was appointed to succeed him, but in the following year went to Würzburg, whence, in 1808, he was called to Munich as secretary to the Academy of Arts, and was ennobled by King Maximilian-Joseph. Here he lived for 33 years, during

the last 14 of which he occupied the chair of philosophy in the newly-established university of Munich, but in 1841 he followed a call from Friedrich-Wilhelm IV. to Berlin, where he mainly resided for the rest of his life. He died at the baths of Ragaz, in Switzerland, August 20, 1854. We now revert to S.'s philosophical career. What may be regarded as its third period, if not its third phase, is chiefly marked by incessant controversy. With the exception of *Bruno, oder über das Göttliche und Natürliche Princip der Dinge* (Bruno, a Dialogue concerning the Divine and Natural Principle of Things, Berl. 1802), and the *Vorlesungen über die Methode des Akademischen Studiums* (Lectures on the Method of Academical Study, Stuttg. and Tüb. 1803), most of S.'s writings are polemical—often hotly so. The most notable are, his *Philosophie und Religion* (Tüb. 1804), in reply to Eschenmayer; *Denkmal der Schrift von den Göttlichen Dingen* (Tub. 1812), in reply to Jacobi; and *Darlegung des Wahren Verhältnisses der Naturphilosophie zur verbesserten Fichte'schen Lehre* (Statement of the true relation of the Nature-philosophy to the improved Fichtian Doctrine, Tüb. 1806). Meanwhile, a most formidable adversary had risen up in his old college-friend, Hegel (q. v.), who was at first an ardent disciple of S.'s, just as Schelling had been of Fichte, but who had, in a similar manner, broken away, and was now pursuing an independent, and professedly antagonistic, course of speculation. During the reign of Hegelianism, S. preserved an almost unbroken silence. For more than 20 years he published almost nothing, but we know that he was far from being idle. He was observing narrowly the practical as well as the speculative results of the rival system, and maturing his own philosophy for the final phase which it assumed, and which he called variously, the 'positive,' the 'historical,' and the 'system of Freedom'— the design of which was to interpret, at once philosophically and reverentially, the history, and, especially, the religious history of mankind. S. admitted that his earlier speculations, though sound in themselves, attained only to 'negative' truth, and to shew that the most transcendental metaphysician need not be a Pantheist, but might be a believer in a Personal God, or even in a Trinity, with a whole Augsburg Confession to boot, he began to apply or develop in a practical way what he conceived to be the principles of his system. It cannot be said that the result has proved satisfactory, though many of his contemporaries thought it would—Neander, for example, dedicating to him, in the most eulogistic terms, the first volume of his *Kirchengeschichte*, on the ground that it was in harmony with S.'s new philosophy. The writings that contain the fruits of S.'s latest thinking were for the most part posthumously published, although a general idea of them had become known to the public through such lectures as those on the *Philosophy of Mythology*, and the *Philosophy of Revelation*. S.'s *Sämmtliche Werke* (14 vols., Stuttg. 1856—1861) were edited by his sons, Karl Friedr. Aug. and Hermann Schelling. His Correspondence was published at Munich in 1863. Various French writers, such as MM. Matter, Remusat, Cousin, Michelet, have tried (with indifferent success) to explain the great mystic to their countrymen; and English philosophical literature is dubiously associated with his name, through what may be called the somnambular plagiarisms of a kindred genius, Samuel Taylor Coleridge. These were first pointed out by Professor Ferrier in *Blackwood's Magazine*, March 1840.

SCHE'MNITZ, the largest and most famous mining town of Hungary, stands in a narrow mountain gorge, at the height of 1054 feet, on a river of the same name, 70 miles north of Pesth. Together with its six suburbs, some of which, however, are at a distance of several miles, it has a population of 22,000; but the town proper has only 8500 inhabitants. The academy for mining and woodcraft, embracing collections of minerals and a chemical laboratory, is the principal building, and forms the chief architectural feature of the town. In 1854, 200 pupils attended the academy, and received lessons from six professors. A highly-esteemed kind of tobacco-pipe heads are manufactured here. The mines, which extend under the town, have been worked for centuries, though recently they have yielded but an inconsiderable profit. They produce gold and silver, as well as copper, iron, and sulphur, and give employment to 8000 workmen. Twelve of the mines belong to the crown, the others are private property.

SCHENE'CTADY, a city of New York, U. S., on the Erie Canal and the south bank of the Mohawk River, 16 miles north-west of Albany. It is the seat of Union College, and contains 12 churches, 2 banks, 2 newspapers, large machinery and locomotive works, 4 foundries, cotton-mills, and manufactories of shawls, agricultural implements, &c. S. was settled by the Dutch in 1661. In 1690, a large number of the inhabitants were massacred by the French and Indians. Pop., in 1860, 9579.

SCHE'RZO (Ital. jest, sport), in Music. A term applied to a passage or movement of a lively and sportive character, forming part of a musical composition of some length, as a symphony, quartett, or sonata.

SCHE'VENINGEN (pron. *Skäveningen*), a populous and thriving village in South Holland, is situated on the coast of the North Sea, about two miles from the Hague. Pop. nearly 8000. Fishing is the chief industry; ship-building, rope-spinning, and making sailcloth, being also carried on. It is the most fashionable sea-bathing resort in the Netherlands, and is visited by many distinguished strangers, there being an excellent 'Bath House,' and other hotels. In the neighbourhood, are summer residences of the royal family and nobility. A range of sand hills defends the village from the sea, which has, nevertheless, made so great encroachments that the Protestant church, originally built in the centre of the houses, is now close by the strand. The road from the Hague to S. is a long avenue of fine trees and wooded banks. In 1864, a tramway for passengers and goods was opened.

SCHIEDA'M (pron. *Skeedam*), a town in South Holland, four miles west of Rotterdam, situated on the Schie, which, by a broad canal or haven, is connected with the Maas. Pop. in 1864, 16,176. The streets are generally narrow, irregularly built, and, compared with other Dutch towns, have a dirty appearance, from the smoky distilleries, malting-works, and grain-mills. It is a town so much engaged in manufacturing gin, and the preparatory processes, that the air and water smell and taste of it. In 1863, there were 236 distilleries; 74 works for preparing malt, &c., and 20 cooperages. The neighbouring meadows are rich in cattle, which are partly fed from the refuse of the distilleries. Grain is largely imported from Russia, Sweden, and Denmark. In 1863, 5514 inland vessels, with an aggregate tonnage of 115,202, and 552 sea-going ships, entered the haven. Nearly two-thirds of the population belong to the Protestant churches; the remainder, except 30 Jews, are Roman Catholics.

SCHILLER, JOHANN CHRISTOPH FRIEDRICH VON, one of the greatest poetical geniuses of Germany, was born at Marbach, a little town of Würtemberg, on November 11, 1759. His father, Joh. Kaspar

Schiller, was overseer of the nurseries attached to a country-seat of the Duke of Würtemberg. S. received his first formal instruction from the parish priest Moser, at Lorch; and in 1773, the duke, who had formed a favourable opinion both of S. and his father, offered to educate the boy, free of expense, at the military academy founded by him at the castle of Solitude, and afterwards transferred to Stuttgart under the name of Karls-schule. The offer was accepted, and entering the rigorous academy, S. tried to devote himself to jurisprudence. His success in the new study was small, and after two years, he exchanged it for medicine. But literature, especially poetry, was the secret idol of his soul, and its chief delight. Already the characteristics of his genius—his tendencies towards epic and dramatic idealism—were showing themselves in his predilections. His first literary attempts of any moment were dramatic—*Der Student von Nassau* and *Cosmus von Medici*—which were consigned (doubtless not without reason) to the fire. Meanwhile, the poet's general intellectual culture and his professional studies went steadily on; and in 1780, he passed as a military surgeon, but with no liking for such a career. In 1778, S. completed the first sketch of his memorable drama, *Die Räuber* (The Robbers), the publication of which, in 1780, excited the most violent enthusiasm among the young all over Germany, so wild, and strong, and glowing were the passion and fancy displayed in it. Respectable people, dignitaries, functionaries, and the like, were, of course, deeply scandalised; and the duke himself, a 'Serene Highness' sort of man, was induced to lecture the poet on his delinquency, and forbade him to write any more poetry 'without submitting it to *his* inspection!' In 1782, *The Robbers* was brought upon the stage at Mannheim—the poet being present without the knowledge of his superiors, the result of which was arrest for a fortnight! This led to further complications; and finally, in October of the same year, S. fled from the harsh service of the duke into Franconia, and lived for a year under a feigned name at Bauerbach, near Meiningen, where he completed his *Fiesco* and *Cabale und Liebe*, begun at Stuttgart. *Don Carlos* was also sketched in outline here. In September 1783, he went back to Mannheim, and was for some time closely connected with actors and theatrical life. To this period belong several of his lesser poems. With the *Cabale und Liebe* above mentioned ended the first poetic period in S.'s career, otherwise known as the *Sturm und Drang* period, in which a burning energy of passion and a robust extravagance, passing often into sheer bombast of speech, are the predominant characteristics. In March 1785, S. left Mannheim, and proceeded to Leipzig, where he became acquainted, among others, with Huber and Körner, and wrote his beautiful *Lied an die Freude*; thence, after a few months, he went to Dresden, where he began the practice of composing during the night, which so fatally assisted in shortening his life. *Der Geisterseher* (The Ghost-seer), a strikingly powerful romance, was written here; and the drama of *Don Carlos* was completed. In 1787, he was invited to Weimar, and was at once warmly received by Herder and Wieland; but some years elapsed before Goethe and he could understand one another; after that, they became the closest friends. Henceforth, S. owed more to Goethe than to all other men: we may even call the later and best writings of S. inspirations of Goethe. The study of the spirit and literature of antiquity in particular exercised a wholesome influence over him, and in his *Götter Griechenlands* (Gods of Greece), which belongs to this stage, we see how calm, and clear, and sunny his once turbid and stormful imagination was gradually becoming. Reinhold of Jena introduced him to the Kantian philosophy, and for some little time S. was in danger of lapsing from a poet into a metaphysician. The philosophical and æsthetic treatises springing out of this new study were collected and published under the title of *Kleine prosaischen Schriften* (4 vols., Jena, 1792—1802). His *Geschichte des Dreissigjährigen Kriegs* (History of the Thirty Years' War) originally appeared in the *Taschenkalender für Damen* (1790—1793). On the occasion of the poet's marriage in 1790 with Charlotte von Lengefeld, the Duke of Meiningen made him a *Hofrath* (privy-councillor); the French Republic also conferred on him the right of citizenship; and in 1802, the emperor raised him to the rank of nobility. While staying for a year with his relatives in Würtemberg, he wrote his exquisite *Briefe über ästhetische Erziehung* (Letters on Æsthetic Culture). This period, reaching to the close of 1794, is generally regarded as S.'s *transition* period; in poetic accomplishment, it is not rich, but in earnest, thoughtful, and manifold speculation it was highly important to the poet, and we find that it prepared the way for the last and most splendid development of his genius. After 1795, the finest of his lyrics and dramas were produced—as *Der Spaziergang* and the *Lied der Glocke* (Song of the Bell) in 1796, *Wallenstein* (1799), *Maria Stuart* (1800), *Die Jungfrau von Orleans* (1801), *Braut von Messina* (Bride of Messina, 1803), and finally his greatest drama, *Wilhelm Tell* (1804). But his health had been long giving way, partly owing to a natural weakness of constitution, and partly to incessant application to study; and on May 9, 1805, he expired, at the early age of 46. Ever since his death, the fame of S. has been on the increase; he has long been recognised as, next to Goethe, the greatest poet that Germany has produced, and innumerable editions of his works in whole or part have been published. The best account of him and his works is given by Carlyle in his *Life of Friedrich Schiller* (Lond. 1825).

SCHINKEL, KARL FRIEDR., a German architect of great celebrity in his own country, was born at Neuruppin, March 13, 1781, and studied the principles of drawing and design at Berlin under Professor Gilly. In 1803, he went to Italy to extend his professional knowledge; but on his return in 1805, he found the aspect of public affairs so threatening that he could obtain little employment, and was forced to betake himself to landscape-painting. In May 1811, he was elected a member of, and in 1820 a professor at, the Berlin Academy of Arts. Other offices and honours were also conferred on him. He died October 9, 1841. The designs to which he chiefly owes his reputation are those of the Royal Guard-house, the Memorial of the War of Liberation, the New Theatre, the New Potsdam Gate, the Artillery and Engineers' School, in Berlin; the Casino, in Potsdam; another in the gardens of Prince Karl at Blienike, near Potsdam; and a great number of castles, country-houses, churches, and public buildings. S. was a man of powerful and original genius; his designs are remarkable for the unity of idea by which they are pervaded, and the vigour, beauty, and harmony of their details.—See Kugler's *Karl Friedr. Schinkel* (Berl. 1842).

SCHI'NUS, a genus of trees and shrubs of the natural order *Anacardiaceæ*, natives of South America. The leaves so abound in a resinous or turpentine-like fluid, that upon the least swelling of the other portions of the leaf by moisture, it is discharged from the sacs which contain it. Thus they fill the air with fragrance after rain, or if thrown into water,

start and jump about as if alive, discharging jets of this peculiar fluid. The same phenomenon is exhibited by the leaves of some species of the kindred genus *Duvaua*, of which specimens are occasionally to be seen in our greenhouses. The leaves and twigs when bruised have a very strong odour of turpentine.

SCHISM, GREEK, the separation between the Greek and Latin churches, which originated in the 9th, and was completed in the 12th century. See GREEK CHURCH.

SCHISM, WESTERN, a celebrated disruption of communion in the Western Church, which arose out of a disputed claim to the succession to the papal throne. On the death of Gregory XI. in 1378, a Neapolitan, Bartolomeo Prignano, was chosen pope by the majority of the cardinals in a conclave at Rome under the name Urban VI. Soon afterwards, however, a number of these cardinals withdrew, revoked the election, which they declared not to have been free, owing to the violence of the factions in Rome by which the conclave had, according to them, been overawed; and, in consequence, they proceeded to choose another pope under the name Clement VII. The latter fixed his see at Avignon, while Urban VI. lived at Rome. Each party had its adherents, and in each a rival succession was maintained down to the council of Pisa in 1410, in which assembly both were deposed, and a third pope, John XXIII., was elected. This measure not having been acquiesced in by all, a new council was convened at Constance in 1417, in which not alone the former rivals, but even the new pontiff elected, by consent of the two parties, at Pisa, were set aside, and Otho Colonna was elected under the name of Martin V. In this election the whole body may be said to have acquiesced; but one of the claimants, Peter de Luna, called Benedict XIII., remained obstinate in the assertion of his right till his death in 1430. The schism, however, may be said to have terminated in 1417, having thus endured nearly 40 years.

SCHI'SMA, the name given to one of the very small intervals known in the theory of music, which amounts to the difference between the *Comma ditonicum* and *Comma syntonicum*. See COMMA.

SCHIST (Gr. *schistos*, split) is a term applied somewhat loosely to indurated clays, as bituminous schist and mica schist. It is more correctly confined to the metamorphic strata, which consist of plates of different minerals, as mica schist, made up of layers of quartz separated by laminæ of mica; chlorite schist, a green rock in which the layers of chlorite are separated by plates of granite or felspar; and hornblende schist, a black rock composed of layers of hornblende and felspar, with a little quartz.

SCHLA'NGENBAD, one of the most distinguished spas of Germany, on the northern frontier of the Rheingau district, 6 miles west of Wiesbaden, in a beautiful and secluded situation, embosomed amid wooded hills. The water of the baths has a temperature of 80° F., and contains the muriates and carbonates of lime, soda, and magnesia, with a slight excess of carbonic acid. The baths have a marvellous effect in beautifying the skin, and in soothing and tranquillising. The village is itself very small, and in the height of the season the pop. is only about 1000.

SCHLEGEL, AUGUST WILHELM VON, a distinguished critic, poet, and scholar, was born at Hanover, 8th September 1767, and studied at Göttingen, where he acquired a reputation by his devotion to philological and classical studies. He first began to assume a prominent position in literature, while a lecturer at Jena, contributing assiduously to Schiller's *Horen* and *Musen-Almanach*, and to the *Allgemeine Literaturzeitung*. About the same time, his translation of Shakspeare began to appear (9 vols. Berl. 1797—1810), the influence of which on German poetry and the German stage was equally great. Subsequently, the poet Tieck, with S.'s consent, undertook a revision of the work, together with a translation of such pieces as S. had omitted (12 vols. Berl. 1825, 1839, 1843); and from their conjoint labours, the people of Germany are able to form a faithful idea of the surpassing genius of our countryman. S. also delivered at Jena a series of lectures on æsthetics, and along with his brother, Friedrich, edited the *Athenaeum* (3 vols. Berl. 1796—1800), which in spite of, perhaps because of, the severity of its criticism, gave a lively and wholesome impulse to the poetry of its time. He published, besides, his first volume of poems (*Gedichte*, Tub. 1800); and, again in company with his brother, the *Charakteristiken und Kritiken* (2 vols. Königsb. 1801). In 1802, S. left Jena for Berlin, where he gave a second series of lectures on literature, art, and the spirit of the time. Next year appeared his *Ion*, an antique tragedy of considerable merit. It was followed by his *Span. Theater* (2 vols. Berlin, 1803—1809), consisting of five pieces of Calderon's, admirably translated, the effect of which has been to make that poet quite a favourite with the German people; and his *Blumensträusse der Ital., Span., und Portug. Poesie* (Berl. 1804), a charming collection of lyrics from the sunny south, from the appearance of which dates the naturalisation in German verse of the metrical forms of the Romanic races. Probably his most valuable, and certainly his most widely popular work, was his *Vorlesungen über dramatische Kunst und Literatur* (3 vols. Heidelb. 1809—1811), originally delivered at Vienna, in the spring of 1808, and translated into most European languages. During 1811—1815, S. published a new collection of his poems (*Poetische Werke*), which contains his masterpieces, 'Arion,' 'Pygmalion,' 'St Lucas,' and is notable for the richness and variety of its poetic forms, as also for the singular facility and elegance of the versification. In 1818, S., now raised into the ranks of the nobility, and privileged to use the sacred *von* before his name, was appointed Professor of History in the university of Bonn, and devoted himself especially to the history of the fine arts and to philological research. He was one of the first students of Sanscrit in Germany, established a Sanscrit printing-office at Bonn, and an *Indische Bibliothek* (2 vols. Bonn, 1820—1826). Among the proofs of his scholarly activity in this department of knowledge, may be mentioned his edition of the *Bhagavad Gîta*, an episode from the epic poem, *Mahâbhârata*, with a Latin translation (2d ed. Bonn, 1846), and of part of the *Râmâyana* (Bonn, 1829—1839). His other works it is unnecessary to mention. S. was not happy in his domestic relations. He was twice married, first to a daughter of Professor Michaelis of Göttingen, and again to a daughter of Professor Paulus of Heidelberg, but in both cases a separation soon became necessary. S. was quarrelsome, jealous, and ungenerous in his relations with literary men, and did not even shrink from slander when his spleen was excited. He died 12th May 1845.

SCHLEGEL, KARL WILHELM FRIEDRICH VON, distinguished both for his scholarship and intellectual ability, was a brother of the preceding, and was born at Hanover, 10th March 1772. He

studied at Göttingen and Leipzig, and in 1797, published his first work. *Griechen und Römer* (The Greeks and Romans), which won praise from old Heyne. It was followed in the course of a year by his *Geschichte der Poesie der Griechen und Römer* (History of Greek and Roman Poetry), a sort of fragmentary continuation of the former. Both of these productions bore evidence of rich learning, independent thought, and a thorough appreciation of the principles and method of historic criticism; but the chief vehicle at this time for the dissemination of his philosophical views of literature was the sharp-fanged periodical called the *Athenaeum*, edited by himself and his brother, August Wilhelm. Proceeding to Jena, he started there as a *privat-docent*, holding lectures on philosophy, which met with great applause, and still editing the *Athenaeum*, to which he also began to contribute poems of a superior quality, and in the most diverse metres. In 1802, appeared his *Alarkos*, a tragedy, in which the antique-classical and new-romantic elements are singularly blended. From Jena, he soon went to Dresden, and thence to Paris, where he gave a few more of those philosophical prelections, in the manufacture of which both he and August Wilhelm were unhappily much too expert; edited the *Europa*, a monthly journal (2 vols. Frankf. 1803-1805); and applied himself assiduously to the languages of Southern Europe, and still more assiduously to Sanscrit, the fruits of which were seen in his treatise, *Ueber die Sprache und Weisheit der Indier* (Heidelb. 1808). See PHILOLOGY. During his residence in Paris, he also published a *Sammlung Romantischer Dichtungen des Mittelalters* (Collection of Medieval Romantic Poems, 2 vols. Par. 1804), and the pious-chivalric romance of *Lother und Maller* (Berl. 1805). On his return to Germany, he published a volume of dithyrambic and elegiac poems (*Gedichte*, Berl. 1809). At Cologne, he passed over to the Roman Catholic Church, a change to which his medieval studies powerfully contributed, and which, in its turn, no less powerfully affected his future literary career. In 1808, S. went to Vienna, where, in 1811, appeared his *Ueber die neuere Geschichte* (Lectures on Modern History), and in 1815, his *Geschichte der alten und neuen Literatur* (History of Ancient and Modern Literature). In 1822, a collected edition of his writings, in 12 vols. (*Sämmtliche Werke*), was published by himself. Subsequently, he delivered two series of lectures, one on the Philosophy of Life (*Philosophie des Lebens*, Vienna, 1828), and another on the Philosophy of History (*Philosophie der Geschichte*, Vienna, 1829), both of which are well known in England and other countries through the medium of translations. S. died 12th January 1829. His MSS. were published by his friend Windischmann (2 vols. Bonn, 1836-1837).

SCHLEIERMACHER, FRIEDRICH ERNST DANIEL, one of the greatest and most influential theologians of modern times, was born at Breslau, 21st November 1768. His boyish years were spent in the school kept by the Moravian brotherhood at Niesky, and here he first received those religious impressions the influence of which was visible in his whole after-life. In 1787, he proceeded to the university of Halle; and on the conclusion of his academic course, acted for some time as a teacher; but in 1794 became assistant-clergyman at Landsberg-on-the-Warthe, where he remained for two years. He then went to Berlin, and occupied himself partly in the translation of some of Blair's and Fawcett's Sermons, and in the redaction of the *Athenaeum*, conducted by his friend Friedrich Schlegel; but the first work that won for him general celebrity was his *Reden über die Religion* (Discourses on Religion, Berl. 1799), which startled Germany from its spiritual torpor, vindicated the eternal necessity of religion, and sought to separate those elements of it that are essentially divine from the incrustations of dogma and the formalities of practice. Neander looked upon these *Reden* as making the turning-point in his spiritual career. They are now regarded as both making and marking an epoch in the theological history of Germany. The *Reden* were followed by the *Monologen*, and the *Briefe eines Predigers ausserhalb Berlin* in 1800. Two years later, he was appointed preacher at the Charity-house in the Prussian capital; and during 1804-1810, produced his famous translation of Plato, with commentary, which is considered in Germany, to this day, the most profound and penetrating treatise on the philosophy of the great Athenian, though English scholars are disposed to regard its criticism as decidedly too subjective, and in many important respects baseless. In 1801 appeared the first collection of his *Predigten* (Sermons), followed between 1808-1833 by no fewer than six other collections. They are masterpieces of penetrating and eloquent discussion, appealing equally to the heart and the intellect of hearers and readers. In 1802, S. went as court-preacher to Stolpe, where he published his *Grundlinien einer Kritik der bisherigen Sittenlehre*; and in 1804, was called to Halle as University-preacher and Professor of Theology and Philosophy. In 1807, he returned to Berlin, having previously published *Die Weihnachtsfeier, ein Gespräch* (Christmas Festival, a Dialogue, Halle, 1806), bearing on the calamitous state in which Germany then found herself, owing to the victorious insolence of the French. Among his next publications may be mentioned *Ueber den sogenannten ersten Brief des Paulus an den Timotheus* (Concerning the so-called first Epistle of Paul to Timothy, Berl. 1807). In 1809, he became pastor of Trinity Church, Berlin; and in 1810, when the university of Berlin was reopened, with a brilliant array of professors, under the rectorship of Fichte, no name shone more conspicuous than that of Schleiermacher. In 1811, he was chosen a member of the Berlin Academy of Sciences, in whose Transactions are to be found many valuable papers by S. on the ancient philosophy; and in 1814, secretary of the philosophical section. In 1817, he was appointed president of the synod assembled in Berlin. His latest, and perhaps his most important work is *Der Christliche Glaube nach den Grundsätzen der Evang. Kirche im Zusammenhange dargestellt* (The Christian Faith systematically presented according to the fundamental Propositions of the Evangelical Church, 2 vols. Berl. 1821—1822), in which his deepest and most Christian thought is visible. He died at Berlin, 12th February 1834. The list of S.'s disciples—i. e., of men who have derived the groundwork of their principles from him—is one of the most splendid that any theological reformer could shew, embracing, among others, the names of Neander, Nitzsch, Twesten, Olshausen, Lucke, Bleek, and Ullmann. In 1864, appeared a posthumous work of S., *Das Leben Jesu, Vorlesungen an der Universitat zu Berlin im Jahr* 1832, in which he conceives of Jesus, as a man in whom the divine spirit works as perfectly as it possibly can in humanity, and treats his history accordingly. Strauss has replied in a critique (Berl. and Lond. 1865). S. was very far from what in England is called orthodox, but he was a great, earnest, devout Christian man, of massive understanding, and whose eloquence was scarcely less golden than that of Plato himself. Germany overflows with literature on S., his system, and his ideas.—For an account of his earlier life, see the

autobiographical sketch first published in Niedner's *Zeitschrift für historische Theologie* (1851); and for his later life, *Aus Schleiermacher's Leben in Briefen* (2 vols. Berl. 1858; translated into English by Frederica Rowan. 2 vols. Lond. 1860).

SCHLE'STADT, a fortified town of France, in the dep. of Bas-Rhin, stands on the left bank of the Ill, and in the midst of a fruitful district, 28 miles south of Strasburg, on the Strasburg and Bâle Railway. Pottery has long been manufactured here. Pop. (1862) 8968.

SCHLESWICK. See SLESVIG.

SCHLOSSER, FRIEDR. CHRISTOPH, a distinguished German historian, was born at Jever, 17th November 1776, educated at Göttingen, and after spending many years as a private tutor and academic teacher, he was, in 1817, called to Heidelberg as a Professor of History, where he died, September 23, 1861. His principal writings (arranged in the order of time) are *Abälard und Dulcin* (Gotha, 1807); *Leben Beza's und des Peter Martyr Vermili* (Heidelb. 1809); *Geschichte der Bilderstürmenden Kaiser des Oeström. Reichs* (Frankf. 1812); *Weltgeschichte in Zusammenhängender Erzählung* (Frankf. 1817—1824); *Geschichte des 18 Jahrh.* (Heidelb. 1823); *Universalhistorische Uebersicht der Geschichte der Alten Welt und ihrer Cultur* (Frankf. 1826—1834); *Weltgeschichte für das Deutsche Volk* (1844—1853); and *Studien über Dante* (1856). Of these works, the most notable are the *Geschichte des 18 Jahrh.*, continued by S. in the later editions till the fall of Napoleon, and the *Weltgeschichte für das Deutsche Volk*, which have been translated into English and other tongues. S. is a keen, critical, and powerful writer, who judges men and events by a stern ethical standard.

SCHMALKALD, LEAGUE OF, the name given to the defensive alliance concluded provisionally for nine years at Schmalkalden (q. v.), 27th February 1531, between nine Protestant princes and eleven imperial cities, with whom other five princes and ten imperial cities subsequently made common cause; and the Elector of Saxony and the Landgrave of Hesse were appointed chiefs of the league, and empowered to manage its affairs. The object of this formidable alliance, which included the whole of Northern Germany, Denmark, Saxony, and Würtemberg, and portions of Bavaria and Switzerland, was for the common defence of the religion and political freedom of the Protestants against the Emperor Charles V. and the Catholic states. The league was not rendered superfluous by the religious peace of Nürnberg in 1532, and on the rumour that the emperor was meditating new hostile measures against the Protestants, another meeting of the confederates was held 24th December 1535, which resolved to raise a permanent army of 10,000 foot and 2000 cavalry, and to prolong the league for ten years. The confederation was further consolidated by articles of guarantee which were drawn up by Luther at Wittenberg in 1536, and being subscribed by the theologians present at the meeting of the league at Schmalkalden in February 1537, were called the *Articles of Schmalkald*. Against the league, the emperor, engaged as he was at the time in contests with the Turks and French, found himself unable to contend, though supported by the Holy League, a Catholic confederation formed in 1538, in opposition to the Protestant one. But impolitic management, mutual jealousies, and conflicting petty interests, dissipated their energies, and prevented united action. The 'War of Schmalkald' commenced by the advance of the army of the league, under Sebastian Schärtlin, into Swabia, to bar the approach of the imperial army from Italy. Schärtlin forced his way to the banks of the Danube, but the miserable jealousy of the Saxon princes paralysed his action. The emperor, by a proclamation bearing date 20th July 1546, put the two chiefs of the league under the ban of the empire; Maurice, Duke of Saxony, took possession of the electorate, by virtue of an imperial decree; and the Protestant army was forced to retreat. The Elector of Saxony reconquered his electorate in the autumn of 1546, but meantime the imperial army subdued the northern members of the League of S., and advanced into Franconia to meet the combined armies of Saxony and Hesse. The latter were totally routed at Mühlberg (24th April 1547), and both chiefs fell into the emperor's hands. This defeat, which has been ascribed to treason, and was perhaps as much owing to this cause as to weakness, finished the war. The object of the league, the guarantee of the liberty of religion to the Protestants, was subsequently effected by Maurice, now Elector of Saxony, who, by a brilliant feat of diplomacy and generalship, compelled the emperor to grant the treaty of Passau (31st July 1552), by which this freedom was secured.

SCHMA'LKALDEN, an old and interesting town of Hesse-Cassel, Germany, at the confluence of the Stille and Schmalkald, 11 miles north of Meiningen. It is surrounded with double walls, contains two castles, and carries on considerable mining operations, especially in iron, and various manufactures, the chief of which are hardwares. Pop. 5500.

SCHNEE'BERG, a pleasantly-built and important mining town of Saxony, surrounded by mountains, 20 miles south-west of Chemnitz. Rich silver mines were formerly worked in the vicinity, and mining is still the employment of many of the inhabitants. The chief manufactures are silks, thread-lace, and blond. Pop. 7680.

SCHNEE'KOPPÉ, the culminating point of the mountain chain of the Riesengebirge. See BOHEMIA.

SCHOLARSHIP, a benefaction, generally the annual proceeds of a bequest permanently invested, paid for the maintenance of a student at a university. At the university of Oxford there are 40, and at Cambridge, 30 scholarships; the former ranging from £20 to £100, the latter from £25 to £60 yearly. In both universities, the scholars are chosen from the undergraduates, and are often elected before they have begun their attendance at the university. They are on the foundation, but their connection with the college is not so intimate as that of the Fellows. The regulations under which they are placed, and the advantages which they enjoy, differ in the different colleges. A number of the scholarships which were formerly restricted have recently been thrown open to public competition. The Bursaries (q. v.) of the Scottish universities are nearly analogous to the Scholarships of the English.

SCHOLA'STICS, or SCHOOLMEN, originally the name given to the teachers of rhetoric at the public schools under the Roman empire, but now used almost exclusively to denote the so-called philosophers of the middle ages. After the fall of the old classic civilisation, there ensued a long anarchy of barbarism, lasting from the 6th to the 8th c.; but from the time of Charlemagne, a visible improvement took place. That great monarch encouraged learning; and the monasteries as well as the schools which he established, became subsequently the seats of a revived culture of philosophy. Conformably, however, to the spirit of a time in which learning and literary skill were confined to churchmen, philosophical activity shewed itself chiefly in the domain of theology. This preparatory period of scholasticism—say from the 9th to the 11th

c.—embraces the distinguished names of Johannes Erigena Scotus (see ERIGENA), who cannot, however, be properly classed among the Scholastics; Gerbert of Aurillac, afterwards Pope Sylvester II. (q. v.); Berengarius (q. v.) of Tours; and Lanfranc (q. v.), Archbishop of Canterbury. A further development of Scholasticism occurred towards the middle of the 12th c., when Roscelinus opened up the question concerning the nature of universal conceptions, which led to the great struggle between the *Nominalists* (q. v.) and *Realists* (q. v.). This struggle terminated in the triumph of the latter; and henceforth, during the golden age of Scholasticism (the 12th and 13th centuries), it continued to be the prevalent mode of thought in philosophy. Still, however, Scholasticism regarded philosophy as dependent on theology. No one dreamed of doubting, or at least of disputing the truth of any of the church doctrines. These were alike too sacred and too certain to be so handled, and the only thing left for a humble philosopher to do was, in fact, to sort and systematise them: hence the expression *philosophia theologiæ ancilla* (philosophy is the handmaid of theology), which has found its way down to modern times. Whatever did not directly belong to ecclesiastical dogma, was either neglected or treated in accordance with the vague traditions of Platonic or Aristotelian thought handed down from antiquity. Hence sprung that vast array of artificial subtleties and distinctions which had no better foundation to rest on than gross ignorance of the matters discussed, combined with a restless speculativeness. The formulas of logic were abused through an irrational realism, which regarded them not only as a means to the attainment of philosophical knowledge, but as the material organon of philosophy itself. At first, the dialectic treatment of dogma was only fragmentary, as we see it in the principal Scholastics of the 12th c., Gilbert de la Porrée, Alanus ab Insulis, and Petrus Lombardus (q. v.). During the 12th c., however, the increased intercourse of the West with the Arabs and Greeks led to a more definite acquaintance with the physical and metaphysical writings of Aristotle, though still only through the medium of incomplete translations, and in this way the circle of vision of the Scholastics at least widened, if it did not become clearer. From this period dates the almost *papal* authority of the great Stagyrite in philosophy, and the rise of the vast and elaborate systems of medieval theology. The three chiefs of Scholasticism in this, its highest development, were Albertus Magnus (q. v.), Thomas Aquinas (q. v.), and Duns Scotus (q. v.); around each of whom stand groups of more or less independent scholars and followers. The celebrity of such teachers was largely increased by the want of books, which compelled their pupils to rely upon their oral communications, and necessitated those extraordinary public disputations which were the only means 'philosophers' had of advertising their wares in the middle ages. The honour paid to them by their admirers is visible in the epithets attached to their names; thus, Alanus is the *Doctor universalis;* Alexander Hales (q. v.), the *Doctor irrefragabilis;* Duns Scotus, the *Doctor subtilissimus;* Thomas Aquinas, the *Doctor angelicus;* Guillaume Durand of St Pourcain, the *Doctor resolutissimus,* &c.

With Thomas Aquinas and Duns Scotus, Scholasticism culminated. After their time, various causes co-operated to bring about its decline and fall. The mystical theology (see MYSTICISM) gradually developed its natural antagonism to speculations resting on a basis of formal logic, and not appealing to the human heart and spirit. Such men as St Bernard (q. v.) of Clairvaux, and the monks of St Victor at Paris, in the 12th c.; together with Bonaventura, in the 13th, were unconsciously hostile to the dominant style of thought; while in the 14th and 15th centuries, Tauler, Thomas à Kempis, Gerson, Nicholas of Clemangis, and others, deliberately set themselves against it. The very nature of the Scholastic thought was inimical to its own perpetuity. The hyper-logical, hair-splitting course which it followed produced rival systems, and results discordant with the doctrines of that theology which it undertook to support, until it finally laid down the astounding proposition, that a thing might be philosophically true and theologically false, and *vice versâ.* The quarrels of the two great orders—the Dominicans and the Franciscans—each of which took part with its metaphysical chief; the former being called Thomists (from Aquinas), and the latter, Scotists (from Duns Scotus), materially injured the common cause of Scholasticism; and the revival of Nominalism under William of Occam (q. v.), its most distinguished advocate, powerfully contributed to the same result; but it was not till after the revival of letters had done its work of enlightening the judgment and purifying the taste of Europe, that Scholasticism was visibly in danger. The Reformation shook the system to its foundations—Luther himself leading the assault with the strength and valour of a Cœur-de-Lion; but still, so tenaciously did it cling to the semblance of life, that in the universities it held its footing till the 17th c., and even later. In fact, in some Roman Catholic states, such as Spain, it is still almost the only kind of philosophy going. The two great intellectual reformers whose writings mark the transition from the medieval to the modern mode of thought, are Lord Bacon (q. v.) and Descartes (q. v.), who may be said to have administered the death-blow to Scholasticism. The literature of this phase of speculation is enormous, and few critics have ventured far into its cob-webbed regions. For example, the printed writings of Albertus Magnus, Thomas Aquinas, and Duns Scotus, amount to 51 folio volumes; but however glad we may be that the reign of Scholasticism is over, and however thankful to men like Laurentius Valla, Erasmus, Rudolf Agricola, and Ramus, who riddled its ancient and time-honoured flag with the sharp shot of their wit and logic, we ought never to forget, that in ages when the conditions of scientific knowledge or refined taste did not exist, these old monkish dialecticians kept alive the philosophical faculty in Europe by the vivacity and restless ingenuity with which they prosecuted their fantastic speculations.

SCHOMBURGK, SIR ROBERT HERMANN, a celebrated traveller, was born at Freiburg in Prussian Saxony, June 5, 1804. He began at an early age to apply himself to geographical science and natural history, and subsequently made an abortive attempt to succeed as a tobacco-manufacturer in Virginia, United States. In 1830, he went to Anegada, one of the Virgin Isles, and having, by the advice of the governor, carefully surveyed the island, and laid a report before the Royal Geographical Society, he was charged by that learned body with the survey of Guiana in 1835. This enterprise, which was surrounded with formidable difficulties, he satisfactorily achieved, and from time to time laid the results of his investigations before the Society, in whose *Journal* they were regularly published. It was during this exploration, and while he was ascending the Berbice River, that he discovered, January 1, 1837, the magnificent aquatic plant denominated the *Victoria regia* (q. v.). On his return to England in 1839, he was presented with the medal of the Geographical Society for his *Travels and Researches in British Guiana in* 1835—1839 (Lond.

1840), a work which largely contributed to almost every branch of natural science. In 1840, he returned to Guiana, this time under the auspices of the British government, to complete his survey of that country, and survey the boundary-line between it and Brazil; and on his return in 1844, after the completion of his labours, he received the honour of knighthood. The *Description of British Guiana*, a valuable work, was the fruit of this expedition. In 1847, he published an excellent and elaborate *History of Barbadoes*, and in the following year departed for San Domingo, whither he had been accredited as British consul and representative. In this new sphere, he continued to pursue his geographical and scientific researches, the results of which he communicated in Reports to the Geographical Society till 1853. In 1857, he was appointed British representative to the Siamese court at Bangkok.

SCHÖNBEIN, Christian Friedrich, a German chemist, was born at Mitzingen in Würtemberg, 18th October 1799, studied natural science at Tübingen and Erlangen, and in 1824—1825 taught chemical physics at Keilhau, near Rudolstadt. To increase his knowledge, he visited England in 1826, repairing thence to Paris; and in 1828 he was called to a chair in the university of Basel, where his eminent qualifications were speedily recognised. In 1839, he discovered *Ozone* (q. v.), and invented *Gun-cotton* (q. v.) in 1845, obtaining from it by dissolution in ether the material called Collodion (q. v.). Of late years, he has confined himself chiefly to experiments with oxygen. Of his works, which generally first appeared in periodicals, the chief are *Das Verhalten des Eisens zum Sauerstoff* (Basel, 1837), *Beiträge zur physikalischen Chemie* (Basel, 1844), *Ueber die Erzeugung des Ozons* (Basel, 1844), *Ueber die langsame und rasche Verbrennung der Körper in atmosphärischer Luft* (Basel, 1845).

SCHÖNBRUNN, a royal palace in the outskirts of Vienna (q. v.), the summer residence of the imperial family.

SCHÖ'NEBECK, a manufacturing town of Prussia, ten miles south-east of Magdeburg, on the left bank of the Elbe. The chemical works, which give employment to from 250 to 300 men—the salt refineries, where the brine obtained from the abundant salt-springs is boiled down, and salt made to the annual value of 413,000 thalers—and the powder and paper mills, are the principal industrial establishments. Pop. (1862) 9049.

SCHOOLCRAFT, Henry Rowe, American author, geologist, and ethnologist, was born at Watervleit (now Guilderland), New York, March 28, 1793. He entered Union College in his fifteenth year, and studied French, German, Hebrew, chemistry, and mineralogy. In 1817—1818, he visited the mining region west of the Mississippi, sent a collection of minerals and geological specimens to Washington, and wrote *A View of the Lead Mines of Missouri*, &c. (8vo, New York, 1819), and a narrative, since enlarged, entitled *Scenes and Adventures in the semi-alpine Region of the Ozark Mountains of Missouri and Arkansas* (8vo, Philadelphia, 1853). In 1820, he was appointed geologist of an exploring expedition to the Copper Regions of Lake Superior and the Upper Mississippi. He was afterwards secretary of a commission appointed to investigate Indian claims and negotiate treaties, at Chicago. As the result of these labours, he made a report to the government, and wrote also *Travels in the Central Portion of the Mississippi Valley* (8vo, New York, 1825). In 1822, he was appointed Indian agent for the north-western frontier, and established himself at Sault Ste Marie. In 1823, he married Miss Johnston, grand-daughter of an Indian chief, who had been educated in Europe. At this period, being in intimate relations with many Indian tribes, he devoted himself to the study of their history and ethnology. From 1828 to 1832, he was an active member of the legislature of Michigan Territory, and founded its Historical Society, and the Algic Society of Detroit. For his Lectures on the Indian Languages, he received the gold medal of the French Institute. Adding poetry to science, he wrote: *The Rise of the West; Geehale, an Indian Lament; Indian Melodies; The Man of Bronze, or Portraitures of Indian Character; Iosco, or the Vale of Norma;* also a grammar of the Algonquin language. In 1832, he was appointed to the command of an expedition which discovered the sources of the Mississippi, the *Narrative* of which was published (8vo, New York, 1834). As superintendent and disbursing agent for the Indians, he negotiated treaties by which the government acquired lands to the extent of 16,000,000 acres. He visited Europe in 1842, and the following year he made a tour, chiefly for the observation of Indian antiquities, in Western Virginia, Ohio, and Canada. In 1845, he collected the statistics of the Six Nations, and published *Notes on the Iroquois*, &c. (8vo, Albany, 1848). In 1847, the United States Congress authorised his publication of *Historical and Statistical Information concerning the History, Condition, and Prospects of the Indian Tribes of the United States, in six volumes quarto, with 336 Plates by Major Eastman and others* (Philadelphia, 1851—1857). He has also published *Algic Researches; Thirty Years with the Indian Tribes of the North-western Frontier; The Indian in his Wigwam*, &c. In 1847, he was married, for the second time, to Miss Howard of South Carolina, and has since resided at Washington.

SCHOOLMASTER, Army and Navy. In the army, the schoolmaster is a non-commissioned officer of the first class, ranking next to a sergeant-major. His pay varies with length of service, rising gradually from 2*s*. a day on appointment, to 6*s*. 6*d*. a day after long service. He has an advantage over other non-commissioned officers in quarters and certain allowances. To become an army schoolmaster, it is necessary either to be a certificated schoolmaster, or to have served the apprenticeship as a pupil-teacher, and to pass through a course of training for one year at the Royal Military Asylum, Chelsea. After the completion of the training, the candidate is required to enlist as a common soldier for ten years' general service, whereupon he is immediately promoted to the rank of schoolmaster. A few of the most deserving schoolmasters are promoted to be superintending schoolmasters, when they rank as ensigns, and have 8*s*. a day for pay. The duties of the schoolmaster are to teach the soldiers and their children the rudiments of general knowledge, to examine the girls' school, and to deliver lectures to the soldiers. There are, in 1865, 214 army schoolmasters, at a charge of £17,157.

In the navy, the schoolmaster is a chief petty officer, whose duties are analogous to those of the army schoolmaster, except that he has no pupils younger than the ship's boys. Among the subjects he teaches are the taking of solar and lunar observations, and the elements of navigation. His pay ranges from 2*s*. to 4*s*.

SCHOOLMISTRESS, Army, is a person attached to each regiment or corps for the purpose of instructing the daughters of soldiers and their sons under eight years old in the rudiments of English and in plain needlework. She must be a certificated schoolmistress, or a pupil-teacher who

has served her apprenticeship. After admission to the service, she is specially trained for six months at one of four training institutions. This training is at the expense of government. The salary of a schoolmistress varies from £24 a year in the 3d class to £36 a year in the first class. Proper provision is made for the quarters and supplies, of the schoolmistress, whose somewhat anomalous position among rough men calls for the most circumspect behaviour on her part. The annual charge (1865—1866) for army schoolmistresses amounts, for 169, to the sum of £4552.

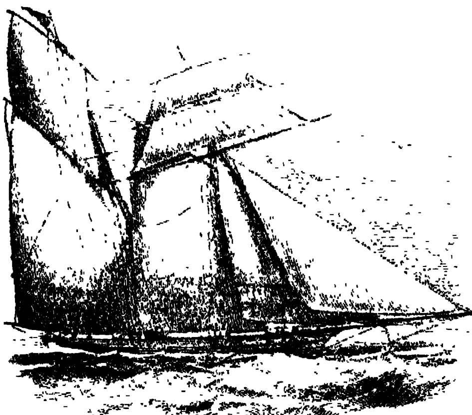
SCHOOLS, Brothers of Christian, a religious congregation in the Roman Catholic Church, established for the religious and secular education of the poor. It originated in France in the end of the 17th c., and was organised by a charitable ecclesiastic, the Abbé de la Salle, canon of the church of Rheims. The members are all lay brothers, and are subject to one general head. Houses of the order are found in almost every country of Europe. In France, this congregation was one of those which were specially excepted from among the suppressed orders, and which were re-established in France by General Bonaparte in the concordat of 1801. It continues to flourish in that country, as also in Belgium, Italy, Southern Germany, Great Britain, and North America. The brethren are bound by the ordinary religious vows of poverty, chastity, and obedience. Their system of education has received the highest testimonies, and they still form one of the most flourishing of all the lay orders in the Roman Church, numbering, it is said, nearly 3000 members. Besides this order, which is of French origin, similar institutes have been formed under the same or analogous names in other countries, the several varieties of which it would be tedious to enumerate.—Sisters of the Christian Schools. Several congregations of women for the education of poor female children also exist in the Roman Catholic Church. A long catalogue of these, with the history of their origin, and their specific constitution, will be found in Wetser's *Kirchen-Lexicon*, vol. ix. pp. 782—784.

SCHOOLS, Public and Grammar. Under their respective heads, Gymnasiums Ev[illegible]ing Schools, Reformatory Schools, and Industrial Schools, have been treated of at sufficient length for the purposes of an encyclopædia. The list of educational institutions would, however, be incomplete were nothing to be said regarding the Public and Grammar schools of England. By the term 'public schools' are generally designated the ancient foundations of Winchester, Eton, Harrow, Westminster, Charter-house, Shrewsbury, St Paul's School, and Merchant Taylors'. But there exist more modern seminaries, which have been instituted chiefly on the model of these, such as Marlborough College, Cheltenham College, and Wellington College. Endowed Grammar Schools of old foundation exist in almost all the principal towns of England, and are frequented both by day pupils and boarders from the country. As almost all the independent and endowed grammar schools of England are taught by men whose notions of school discipline have been formed at one or other of the great public schools, these may fairly be added to those already enumerated as in point of fact Public schools. The course of instruction pursued, the methods of teaching, and the habits of life and of discipline, will be found to be substantially similar in all endowed middle schools, whether called Public or Grammar schools. A great number of these schools derive not only the *fixed* emoluments of the masters from old bequests, but also the means of boarding and educating a certain number of boys on the foundation. It was originally for these foundationers or collegians that a large proportion of the old schools were founded; but round them has grown up a large community composed of pupils from all parts of the British dominions, tutors, and keepers of boarding-houses. The foundationers consequently form simply the nucleus of these schools. The course of instruction is intended to prepare for the universities, and is consequently adapted to this purpose. Latin and Greek form the basis of the whole instruction; geography, ancient history, arithmetic, and mathematics being admitted to a very subordinate place in the curriculum. The school-time devoted to arithmetic and mathematics combined, for example, averages only about three hours a week. Except at Eton, it will be found that at least one modern language enters into the work of every school, that language being either French or German. There are, of course, tutors available at these educational seats for all usual branches of instruction, including music and drawing; but these subjects are alien to the proper work of the school, and do not affect the promotion of the pupils. At Rugby, the school course includes *both* French and German, and natural science is admitted as an alternative study with these. In the more modern institutions, such as Marlborough, Cheltenham, and Wellington Colleges, attempts have been made to provide a modern course of instruction, running parallel with the classical, for the benefit of those boys who either shew an inaptitude for classical studies, or who are not destined for the universities. That a sound education may be obtained by means of science and modern languages, cannot be questioned; but its value, as compared with classical discipline, even for those who do not contemplate a university course, or one of the learned professions, is still an open question. If, however, it be the case that there is a natural inaptitude in some boys for linguistic discipline, who *yet* possess capacity for scientific study or the acquisition of a modern language, we are driven to the conclusion, that such a course of study ought to be provided for this portion of the youth of Great Britain. Whether it ought to be provided at the existing grammar and public schools, is a subject at present keenly debated, but must be ultimately very much a question of finance. In Germany, many of the gymnasiums provide a course of modern or *real* study, and this, combined with the wide diffusion of model schools, under the name of *Real-schulen*, meets all the reasonable wants of that portion of the middle class which does not contemplate a professional life. In France, the *Lycées* provide an ancient and modern course, running parallel with each other, for all pupils above a certain age. Up to that age, all are taught the same subjects. In Scotland, the number of middle schools in important towns, either established by private enterprise or by some ancient statute, renders it unnecessary for boys to seek away from their homes the preparation necessary for either the Scottish universities or commercial life. The Scotch schools are elastic in their system, and adapt themselves to the wants of parents, and all of them admit the modern element largely into their curriculum.

Royal commissions are now (1865) inquiring into the middle-school education of both England and Scotland, and it is probable that there will follow their Reports some measures for the better organisation and the wider diffusion of such schools. These commissions do not, however, interfere with the large public schools proper, which were reported on in 1864.

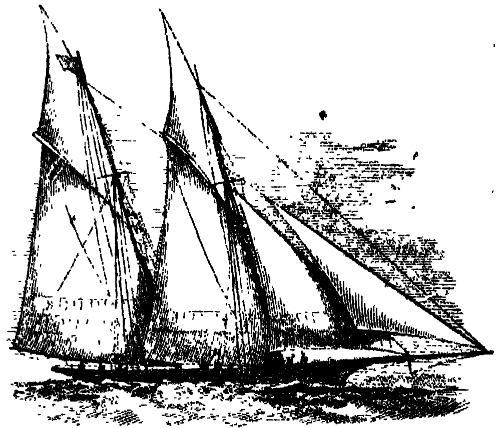
SCHOOLS, Regimental, in the British army, comprise the school for adults and boys above eight years of age, under the Schoolmaster (q. v.), and the infant and industrial schools under the Schoolmistress (q. v.), for girls and little boys. In the first, plain subjects are taught to soldiers who voluntarily attend, or to soldiers' children. The education is wholly secular: the only theological teaching being exposition of a portion of Scripture during the first half-hour of morning school; but even at this, attendance is at the option of the parents. The infant school is conducted on similar principles. The industrial school is to fit girls for the occupations of life, and to render them capable of entering domestic service; a grant of money is made by government for the provision of materials. There is a school of each sort in every battalion of infantry or regiment of cavalry, the total cost of which amounts for 1865 to £30,131. Adult soldiers are admitted gratuitously; for children, there is a nominal charge of 1d. each a month. The orphans of soldiers and the children of soldiers serving abroad are received at any neighbouring school without payment; those of pensioners, contractors, &c. at 3d. a month; and the children of officers at 5s. a month. It is forbidden that any difference should be made in the schools in the treatment of these different classes of pupils.

SCHOONER is a swift, sharply-built vessel, carrying usually two masts, though occasionally a greater number, and commonly is of small size. There are two classes of schooners—the 'fore-and-aft schooner,' or schooner proper, and the 'topsail schooner.' In the former, both foremast and mainmast are rigged like the mainmast of a cutter, with fore-and-aft sails. In the latter, the foremast carries a square topsail and a square topgallant-sail. Off a



Topsail Schooner.

wind, the former rig has a great advantage, as the schooner can sail up within 4½ or even 4 points of the wind; but before the wind, the square topsail gives the advantage to the topsail schooner; and as the latter can on occasion strike her squaresails, and set a fore-and-aft topsail in their place, she has usually the preference. No sailing-vessel is faster than a schooner of fine build, when she carries ample canvas; hence it is a favourite form for the larger class of yachts; and before the introduction of steam dispatch-vessels, was employed much in the packet service. Schooners are still employed in the navy as revenue cruisers; and to a great extent in the merchant service, for running small cargoes, and especially those of perishable goods, as fish or fresh fruit. They are easily managed by a



Fore-and-aft Rigged Schooner.

small crew; but from the sharpness of their build, have no great amount of stowage.

SCHOPENHAUER, Arthur, a German philosopher, son of Johanna Schopenhauer, an authoress of considerable distinction (born 1770, died 1838), was born at Danzig, 22d February 1788. He studied first at Göttingen, where the lectures of Schulze inspired him with a love of philosophy, and afterwards at Berlin and Jena, in the last of which places he graduated in 1813. During the same year, he published his first treatise, *Ueber die vierfache Wurzel des Satzes vom zureichenden Grunde* (Rudolst. 1813, 2d ed. Frankf. 1847), in which he lays down the logical basis of his future system. S. spent the winter of 1813 at Weimar, where he enjoyed the society of Goethe, and the orientalist Friedr. Maier, who first turned his attention to the ancient Indian literature and philosophy, the study of which exercised a great influence on his future development. He then proceeded to Dresden, where he published a treatise on Sight and Colour (*Ueber das Sehen und die Farben*, Leip. 1816), which was followed, three years later, by his great work, *Die Welt als Wille und Vorstellung* (The World considered as Will and Idea, Leip. 1819; 2d ed. 1844). After 1820, S. lived partly in Italy and partly in Berlin, up till 1831, when he fixed himself in Frankfurt-on-the-Maine, devoting himself uninterruptedly to the elaboration of his system. The fruits of his studies were *Ueber den Willen in der Natur* (Frankf. 1836); *Ueber die Freiheit des Willens, Ueber das Fundament der Moral*, the supplements to his principal work, which appear in the 2d edition of 1844; and *Parerga und Paralipomena* (Berl. 1851). He died September 21, 1860. The fundamental doctrine of S. is, that the only essential reality in the universe is will; that what are called appearances exist only in our subjective representations, and are merely forms under which single original will shews itself. This will is not necessarily accompanied by self-consciousness, though it ever strives after its attainment, and hence S. declared himself the uncompromising opponent of all the contemporary systems—those of Fichte, Schelling, and Hegel—in which the 'Absolute Reason,' 'Consciousness,' &c., are posited as the necessary basis of thought. For his great rivals, S. professed the most unmeasured scorn—calling Hegel, for example, a mere 'scribbler of nonsense'—and in return was treated by them with such

sovereign contempt, that for years his name was almost unknown to the majority of German students. His theories of ethics and æsthetics also rest on peculiar and not very intelligible grounds. The best account of S.'s philosophy is to be found in Frauenstädt's *Briefe über die Schopenhauersche Philosophie* (Leip. 1854).

SCHORL. See TOURMALINE.

SCHORL ROCK is a granitoid rock, in which the mica is replaced by schorl or tourmaline. Some specimens occur in which the felspar is also absent, and the mass is composed entirely of quartz and schorl. Schorl rocks are rare, occurring probably only as small bosses in granite.

SCHOTTI'SCHE (Ger. *Scottish*) a somewhat fanciful name given to a slow modern dance in $\frac{2}{4}$ time.

SCHOUW'EN (frequently also called LAND-VAN-ZIERIKZEE), an insular portion of the province of Zeeland (q. v.), bounded on the S. by the Scheldt, on the N. by the most southern branch of the Maas, and on the W. by the North Sea. Area, 60 sq. m.; pop. 15,600. The surface is low, and the island is protected on both sides by dykes. Agriculture is the chief employment of the inhabitants; the soil is fertile, and the principal crops are grain, oil-seeds, and flax. Seafowl in immense flocks breed on the south side of the island, and the sale of their eggs is an important item in the trade of Zierikzee (pop. 7100), which is the principal town.

SCHREVELIUS, CORNELIUS, a Dutch scholar, whose name was once better known than it is now, was born at Haarlem in 1615, and educated mainly by his father. In 1642, he succeeded his father as rector of the university of Leyden, and died 11th September 1664. S. was a laborious and erudite man, but possessed little critical discernment. His most notable performance was a *Lexicon Manuale, Græco Latinum et Latino-Græcum* (Leyden, 1654, 1657, 1664), of which there have been innumerable editions. It was long extensively used as a textbook in English schools, and in the absence of anything better, deserved perhaps the respect which it obtained; but otherwise it cannot be pronounced a good dictionary. It is not at all exhaustive of the words in the Greek language; it does not sufficiently explain their different meanings, and its etymologies are often erroneous and inept. S. also executed many *variorum* editions of the classics, Juvenal (1648), Hesiod (1650), Terence (1651), Virgil (1652), Horace (1653), Homer (1656), Martial (1656), Lucan (1658), Quintus Curtius (1658), Justin (1659), Cicero (1661), Ovid (1662), and Claudian (1665). These editions are remarkable for their correctness, and for the excellence of the paper and typography, but the notes are deficient both in taste and acumen.

SCHUBERT, FRANZ, a German musical composer, who was born at Vienna in 1807, and died at the early age of 25. During his lifetime, his works attracted little notice, but they acquired a high and deserved reputation after his death, and have gained for their composer a large share of posthumous fame. His songs and ballads are hardly to be surpassed for masterly construction and richness of fancy, while they are full of simple, ornate, and expressive melody. S. also composed several operas, symphonies, sonatas, and other larger works.

SCHUMANN, ROBERT, a modern German musical composer of considerable note. He was born at Zwickau, in Saxony, in 1815, and studied chiefly at Leipzig. He is looked on in Germany as one of the founders of a new musical school, of which the other principal exponent is Richard Wagner. This school has undertaken to say what the 'music of the future,' or as some of the school express it, 'work of art of the future,' is to be. Whatever may be said as to S.'s relation to the future, his influence on the music of the present day has been very considerable. English musicians have, however, hesitated to agree with his countrymen in placing him on an equally exalted pinnacle with Beethoven. His compositions evince deep study of Sebastian Bach, as well as a large share of individuality, freshness, and scientific knowledge. They continually surprise us by startling modulations, and the frequent interruptions in the time impart to them an air of eccentricity. S.'s works comprise several symphonies, a cantata called *Paradise and the Peri*, and a number of small pieces, which have obtained more favour in this country than his larger compositions. S. married Mademoiselle Clara Wieck, one of the most celebrated of living pianists, and died in 1856.

SCHUY'LKILL, a river of Pennsylvania, U.S., which rises in the carboniferous highlands of the eastern centre of the state, and flowing 120 miles south-east, empties into the river Delaware 5 miles below Philadelphia.

SCHWANTHALER, LUDWIG MICHAEL, a celebrated German sculptor, was born in 1802 at Munich, where his father, Franz Schwanthaler, practised the same art. Young S. entered his father's workshop at the age of 16; and on the death of the latter in 1821, he undertook to carry on his father's business. His first important commissions were received in 1824 from King Maximilian. After a brief residence in Rome, he set up a studio of his own at Munich, and shortly after executed for the *Glyptothek* there two fine bas-reliefs from Homer: 'Achilles struggling in the Scamander,' and the 'Battle by the Ships,' besides a statue of Shakspeare for the saloon of the theatre, and the Bacchus-frieze for the Banqueting-hall in the palace of Duke Maximilian. In 1832, he revisited Rome, for the purpose of preparing models for the portion of the national monument of Valhalla intrusted to his supervision. He remained two years. On his return to Munich, he began his bas-reliefs to illustrate Pindar's *Epinikia* (Triumphal Odes) and the myth of Aphrodite, the latter of which is a frieze. In 1835, he was appointed professor at the Munich Academy. Henceforth, the interest of his career is mainly professional; but the number of his works is singularly great, while their excellence is such as to place him in the first rank of German sculptors. His distinguishing characteristics are a thorough originality of design, and boldness of imagination; while the extraordinary extent of his acquaintance with the sculpture of Greece and of the Middle Ages gave a great richness and variety to his execution of details. Among his works may be mentioned 24 statuettes in the *Pinakothek* at Munich; the great bas-relief frieze (in the Barbarossa Hall), more than 200 feet long; the models for the 12 statues of the Ancestors of the House of Wittelsbach, the 15 colossal statues for the front pediment of the Valhalla, the models of the 15 statues of the 'Battle of Arminius' for the northern end of the same structure, and the model of the colossal statue of Bavaria, 54 feet high; a marble statue of the Emperor Rudolf for the cathedral of Spires, models for the statues of Goethe and Jean Paul Richter, a statue of Mozart, marble groups of Ceres and Proserpina (at Berlin), &c., besides numerous other works executed by his pupils from his designs and suggestions.

SCHWARZ, CHRISTIAN FRIEDRICH, a distinguished German missionary, was born at Sonnenburg, in Brandenburg, October 26, 1726. He studied at Halle, and having resolved to become a

missionary in the East Indies, obtained ordination at Copenhagen, with the view of joining the Danish mission at Tranquebar, where he arrived in 1750. His career is a beautiful example of what may be accomplished when piety, integrity, good sense, and a charity that knows how to prevent the virtue of zeal from lapsing into the vice of fanaticism, unite harmoniously in a man. After labouring 15 years at Tranquebar, he went to Trichinopoly, where he founded a church and school, and also acted as chaplain to the garrison. Here the fruits of his long and consistent career of pious activity gradually began to shew themselves in considerable conversions from Hinduism. In 1777, another missionary was sent to his assistance; and by the permission of the Rajah of Tanjore, whose friendship he had acquired, he built a church in that city. So highly did the native rulers admire his integrity, that once, when Hyder Ali, of Mysore, was arranging terms of peace with the Madras government, he demanded that S. should act as their agent—'him, and no other one,' said the Sultan, 'will I receive and trust.' On this occasion, S. resided three months at Seringapatam. During the terrible Carnatic war which soon after followed (1781–1783), and for which S. thought the British were to blame, a striking testimony was given of that universal respect entertained for his character. The inhabitants and garrison of Tanjore were dying of starvation, and neither the British nor the Rajah could induce the cultivators to sell them provisions. In despair, S. was appealed to, and when he gave his word that payment should be made, the farmers believed him, and sent the requisite supplies. On the death of the Rajah of Tanjore in 1787, S. was appointed tutor and guardian of his young son, Maha Sarboji, who turned out, under S.'s care, one of the most accomplished sovereigns in or out of India. S. died February 13, 1798.

SCHWARZBURG, House of, one of the oldest German families, founded about the middle of the 12th c., by Sizzo, Count of Schwarzburg and Käsernburg. The two sons of Sizzo were Heinrich, who succeeded his father as Count of Schwarzburg, and Günther, who became Count of Käsernburg. The former, dying childless in 1184, his possessions went to his brother, who left two sons, Günther, who continued the family of the Counts of Käsernburg, and Heinrich, from whom sprung the Counts of Schwarzburg. In 1349, Günther XXI., the younger son of Heinrich XII., was elected Emperor of Germany, but he died within the year of his election. Count Günther XL. of Schwarzburg and Arnstadt, who introduced (1541) the reformation into his states, was the common ancestor of the two existing lines of the Schwarzburg family; his son, Johann Günther, founding the line of Schwarzburg-Sondershausen (q. v.), and Albert, that of Schwarzburg-Rudolstadt (q. v.).

SCHWARZBURG-RUDOLSTADT, a German principality, bounded on the E. by Weimar, Altenburg, and Meiningen, with a detached part, 30 miles to the north, in Prussian Saxony. Area, 367 sq. m., pop. (December 1861) 71,913, of whom 71,668 were Lutherans. It consists of the Upper Lordship (*Rudolstadt*, 282 sq. m.) and the Lower Lordship (*Frankenhausen*, 85 sq. m.). The Schwarza, Ilm, and Saale water the surface, which is for the most part covered with spurs of the Thuringer-wald. The ordinary crops are raised, and timber, salt, and metals are the principal products. The principality contains many spots distinguished for beautiful scenery; and besides the vale of the Schwarza, the convent-ruins of Paulenzelle, and the remains of the castle of Kyffhausen, attract many visitors. S. has one vote in the *plenum*, and a portion of the 15th vote in the *curies*. It furnishes (1865) a contingent of 989 men.

SCHWARZBURG-SONDERSHAUSEN, a German principality, is, with the exception of two small detached portions, surrounded by Prussian Saxony. Area, 324 sq. m.; pop. (December 1861) 64,895. It consists of a Lower Lordship (*Sondershausen*, 187 sq. m.), and an Upper Lordship (*Arnstadt*, 137 sq. m.). The former of these, watered by the Helbe and Wipper, is fertile and agricultural; while the latter is mountainous, and is the seat of active manufactures. S. possesses a vote in the *plenum*, and a part of the 15th vote in the *curies*. This principality contributes (1865) a contingent of 826 men.

SCHWARZENBERG, a princely family of Germany, dates from 1420, when *Erkinger von Seinsheim* purchased the lordship of S. in Franconia, and was raised (1429) by the Emperor Sigismund to the dignity of Baron of the Empire. Two of this family have acquired a European reputation: the first, Adam, Count of S., who was born in 1587, and became prime-minister and adviser of Georg Wilhelm, Elector of Brandenburg. He was all-powerful during the Thirty Years' War, and brought down terrible calamities on Brandenburg by his obstinate adherence to the alliance with Austria against the Protestant league, for which he was punished after the accession of the 'Great Elector,' in 1640, by being despoiled of his power, and imprisoned in the fortress of Spandau, where he died 17th March 1641. The other, Karl Philipp, Prince of S., was born at Vienna, 15th April 1771, first served against the Turks, and had risen to the grade of lieutenant field-marshal in 1799, at which date he raised a regiment of Hulans at his own cost. He was under the orders of Mack in the campaign of 1805, and commanded a division at Ulm; but when he saw that the battle was lost, he cut his way through the French army, and retired with his regiments to Eger, afterwards taking part in the great battle of Austerlitz. He was ambassador at the Russian court in 1808, by the express wish of the Emperor Alexander; fought at Wagram in 1809; and after the treaty of Vienna, conducted the negotiations preliminary to the matrimonial connection of Napoleon with the Hapsburg family; and both in this capacity and as ambassador at Paris, so gained the esteem of Napoleon, that the latter expressly demanded for him the post of general-in-chief of the Austrian contingent of 30,000 men which had been sent to aid France against Russia in 1812. S. with his little army entered Russia from Galicia, passed the Bug, and achieved some slight successes, but was afterwards driven into the 'duchy of Warsaw' (see Poland), and took up a position at Pultusk, where he concluded with the Russians an armistice which secured the French retreat. S. was much blamed for his dilatory conduct at the time; and his tardiness, ascribed by the French historians to secret instructions from his own government, has since been much animadverted upon by them; but nevertheless Napoleon concealed any dissatisfaction he might have felt, and demanded (1813) for him from the Austrian government the baton of field-marshal. After a brief sojourn at Paris, S. was appointed to the command of the Austrian army of observation in Bohemia; and when Austria joined the allied powers, he became generalissimo of the armies of the coalition; gained the victory of Leipzig (q. v.), and introduced a cautious system of tactics, which insured a progressive hemming-in of the French, and in spite of their occasional successes, completely wore them out. On the return of Napoleon from

Elba, he obtained the command of the allied army on the Upper Rhine, and a second time entered France. On his return to Vienna, he was made president of the imperial council for war, received an extensive grant of lands in Hungary, and was allowed to engrave the imperial arms of Austria on his escutcheon. He died of apoplexy at Leipzig, 15th October 1820.—His nephew, FELIX LUDWIG JOHANN FRIEDRICH, born October 2, 1800, distinguished himself in the Italian campaign of 1848, was placed at the head of affairs at Vienna, called in the aid of the Russians against Hungary, and pursued a bold policy in Germany. He died at Vienna, April 5, 1852.

SCHWEDT, a handsome town of Prussia, in the province of Brandenburg, on the Oder, 31 miles south-south-west of Stettin. Weaving, brewing, the manufacture of starch and of tobacco, which is here extensively grown and sold, are the principal branches of industry. Pop. (1862) 7692.

SCHWEI'DNITZ, a charmingly situated town of Prussian Silesia, on the left bank of the Weistritz, 42 miles south-east of Liegnitz, and about the same distance south-west of Breslau by railway. It is in part fortified. Linen and woollen goods, leather, tobacco, and starch are manufactured; and the fairs for corn, cattle, and yarn are much frequented. S. was besieged and taken four times within 50 years, the last time by the French in 1807, when the defences were in great part destroyed. Pop. (1862) 13,302.

SCHWEI'NFURT, an ancient, and long an imperial free city, the *Trajectus Suevorum* of the Romans, now a town of Bavaria, in Lower Franconia, on the Main, 29 miles north-east of Wurzburg by railway. It contains a beautiful market-place, in which important cattle and wool markets are held. Wine-culture, sugar-refining, and manufactures of chemicals and dyeing materials, as white-lead, ultramarine, Schweinfurt Green, &c., are carried on. See GREEN. Pop. 7713.

SCHWE'RIN, capital of the grand duchy of Mecklenburg-Schwerin, is agreeably situated on the west shore of the Schweriner See. The Schweriner See, or Lake of Schwerin, is 14 miles in length, and 3 miles broad, and abounds in fish. S. is divided into the old town, the new town, and the suburb, is well built, and contains a Gothic cathedral, one of the finest edifices of the kind in Northern Germany, begun in 1248, and finished in the 15th century. The ducal castle, occupying the site of the former castle, erected by Wallenstein, stands on a small island. Little trade is carried on. Pop. 21,745.

SCHWYZ, one of the mountain cantons in the middle of Switzerland, is bounded on the N. by the canton of St Gall and the canton and Lake of Zürich, and on the S. by the canton of Uri and the Lake of Lucerne. Area, 353 sq. m.; pop. (December 1860), 45,039, of whom 44,509 are Catholics. The whole surface is covered with mountains, except small tracts in the south-west and north-east; but there are no glaciers nor any everlasting snow except on the Rieselstock, 8890 feet high, on the east frontier. The canton comprises a third part of Lake Zug, the most northern angle of the Lake of the Four Cantons, the whole of the mountain-mass of the Righi (q. v.), the plain in which lies the small Lake Lowerz, and the valleys of the Muotta, Sihl, and Aa, which are the principal rivers. Cattle-breeding is the employment of almost the whole of the inhabitants, and the number of cattle is estimated at about 20,000. Only about one-thirtieth of the whole area is cultivable; fruits and wine are cultivated to some extent; and cattle, cheese, and timber are exported. Such woven fabrics as are required for home use are almost the only manufactures.

S., one of the three original cantons, and also one of the Four Forest Cantons, has supplied the name to the whole country of which it forms a part. The government is a pure democracy.—SCHWYZ, the capital, is a small town, containing a beautiful parish church, and most picturesquely situated 17 miles east of Lucerne.

SCIA'CCA (anc. *Thermæ Selantinæ*), a city of Sicily, in the province, and 30 miles west-north-west of the city of Girgenti, stands on the slope of a hill, the foot of which is bathed by the sea, and is defended by the castle of Luna. It is surrounded by old walls, and has a fine cathedral. Outside the walls are the hot springs; and upon a neighbouring height, there are the so-called *Stufe di St Calogero*. There is a well, at the bottom of which a subterranean noise is heard resembling that of a torrent of rain or of a cascade. The baths are frequented by invalids, and have several grottoes with seats hollowed out in the rock for the accommodation of the bathers. Pop. 14,292.

S. is a seaport well adapted for the exportation of grain, and has many store-houses. It was the birthplace of Agathocles, tyrant of Syracuse, and of Fazelli the historian.

SCIÆ'NIDÆ, a family of acanthopterous fishes, somewhat resembling perches; having a compressed body; a simple or double dorsal fin, the first part spiny; the gill-covers variously armed; the head generally inflated, and its bones cavernous; the scales ctenoid, and in general obliquely ranged. The air-bladder is often furnished with branching appendages. The S. are divided into many genera, and widely distributed. Most of them are marine, but a few inhabit fresh water. Only two species are reckoned as British, the Maigre (q. v.) and the Bearded Umbrina (q. v.), both excellent for the table, as are many others of the family. The power of emitting sounds which belongs to the maigre is possessed also by others of the family in a remarkable degree. Among these are species of *Pogonias*, as *P. chromis*, which inhabits the coasts of Georgia, Florida, &c., and is known, as are others of the family, by the name DRUMFISH, because the sound which it emits resembles that of a drum. It attains a large size, and its flesh is very good, but the tail is often infested with *Filariæ*. In vessels anchored on the coasts which it inhabits, sleep is sometimes almost impossible from the continual drumming carried on all night, accompanied with a tremulous motion of the vessel. How the sound is produced, is not well known.

SCIA'TICA is the term given to neuralgia of the great sciatic nerve. See NERVOUS SYSTEM. It has been shown by Graves to be a frequent complication of gout; but rheumatism, or, perhaps, rather the exposure to cold and wet which so often sets up rheumatism, is its most common cause. It is one of the most obstinate forms of neuralgia. It is characterised by irregular pains about the hip, especially between the great trochanter of the thigh-bone and the bony process on which the body rests when sitting, spreading into neighbouring parts, and running down the back of the thigh to the leg and foot; or the pains may occupy only isolated parts, as the knee-joint, the calf of the leg, or the sole of the foot. The treatment is the same as that of neuralgia generally, except when the disease is merely a complication of gout, in which case the primary disease must be attacked as well as the sciatica.

SCIATI'C STAY (possibly a corruption of *Asiatic*), in merchant-vessels, is a strong rope

fastened between the main and foremast heads. When loading or unloading, a travelling tackle is suspended to it, which can be brought over the fore or main-hatchway as occasion demands.

SCIENCES, the name for such portions of human knowledge as have been more or less generalised, systematised, and verified. Generality as opposed to mere particulars, system as opposed to random arrangement, and verification as opposed to looseness of assumption, concur in that superior kind of knowledge dignified by the title in question. Geography, Chemistry, and Political Economy are now sciences. The first has been so for many ages, although greatly advanced in recent times; the two last, scarcely more than a century. Chemical facts and maxims of political economy had been known from a much earlier date, but they did not in either case amount to science; the generalities were few or bad, system and certainty were both wanting. In the different branches of Natural History—Mineralogy, Botany, Zoology—there had been a large store of accumulated facts before any one branch could be called a science. The *quality* of the knowledge is of more consequence than the quantity.

The term *Philosophy* (q. v.) is to a certain extent, but not altogether, coincident with science, being applied to the early efforts and strainings after the explanation of the universe, that preceded exact science in any department. Both names denote the pursuit of knowledge as knowledge, or for intellectual satisfaction, in contrast to the search that is limited to immediate practice or utility.

The sciences have been variously classified, and the principles of their classification have been a subject of discussion. We shall here describe the mode of classifying them in accordance with present usage, and with the principles most generally agreed upon.

It is convenient to prepare the way by distinguishing between Theoretical Sciences, which are the sciences properly so called, and Practical Sciences. A Theoretical Science embraces a distinct department of nature, and is so arranged as to give, in the most compact form, the entire body of ascertained (scientific) knowledge in that department: such are Mathematics, Chemistry. Physiology, Zoology. A Practical Science is the application of scientifically obtained facts and laws in one or more departments to some practical *end*, which end rules the selection and arrangement of the whole; as, for example, Navigation, Engineering, Mining, Medicine. Navigation selects from the Theoretical Sciences—Mathematics, Astronomy, Optics, Meteorology, &c.—whatever is available for guiding a ship on the seas, and converts the knowledge into rules or prescriptions for that purpose. The arts that can thus draw upon the exact sciences are by so much the more certain in their operation; they are the scientific arts.

Another distinction must be made before laying down the systematic order of the Theoretical Sciences. A certain number of these sciences have for their subject-matter each a separate department of natural forces or powers; thus, Biology deals with the department of Organised Beings, Psychology with Mind. Others deal with the application of powers elsewhere recognised to some region of concrete facts or phenomena. Thus, Geology does not discuss any natural powers not found in other sciences, but seeks to apply the laws of Physics, Chemistry, and Biology to account for the appearances of the earth's crust. The sciences that embrace peculiar natural powers are called Abstract, General, or Fundamental Sciences; those that apply the powers treated of under these to regions of concrete phenomena are called Concrete, Derived, or Applied Sciences.

The Abstract or Theoretical Sciences, as most commonly recognised, are these six: Mathematics, Physics, Chemistry, Biology (Vegetable and Animal Physiology), Psychology (mind), Sociology (society). The Concrete Sciences are the Natural History Group—Meteorology, Mineralogy, Botany, Zoology, Geology, also Geography, and we might, with some explanations, add Astronomy. The Abstract or Fundamental Sciences have a definite sequence, determining the proper order for the learner, and also the order of their arriving at perfection. We proceed from the simple to the complex, from the independent to the dependent. Thus, MATHEMATICS relates to *Quantity*, the most pervading, simple, fundamental, and independent attribute of the universe. The consideration of this attribute has therefore a natural priority; its laws underlie all other laws. As Mathematics is at present understood, it has an Abstract department, which treats of quantity in its most general form, or as applied to nothing in particular—including Arithmetic, Algebra, and the Calculus—and a Concrete or Applied department—viz., *Geometry*, or Quantity in Space or Extension. It has been suggested that General Mechanics, or the estimation of Quantity in *Force*, should be considered a second Concrete department. But usually Mechanics ranks with the next Fundamental Science in order, called Physics.

NATURAL PHILOSOPHY has long been considered the name of a distinct department of science: the designation PHYSICS is now more common. This science succeeds Mathematics, and precedes Chemistry. Of all the fundamental sciences, it has the least unity, being an aggregate of subjects with more or less connection. Mechanics, Hydrostatics, Hydraulics, Pneumatics, Acoustics, Astronomy, are all closely related; they represent the phenomenon of movement in *mass*, as applied to all the three states of matter, Solid, Liquid, and Gas. The remaining subjects—Heat, Light, and Electricity—together with the attractions and repulsions that determine Cohesion, Crystallisation, &c., are described as relating to movement in the *molecule*. We have thus Molar Physics and Molecular Physics; and the tendency is now to treat the two separately.

CHEMISTRY lies between Physics and Biology, reposing upon the one, and supporting the other. It assumes all the physical laws, both molar and molecular, as known, and proceeds to consider the special phenomenon of the composition and decomposition of bodies considered as taking place in definite proportions, and leading to change of properties. The composition of a cup of tea from water, sugar, milk, and infusion of tea-leaf, is physical; the composition of marble from oxygen, carbon, and calcium, is chemical. In the one case, the properties of the separate ingredients are still discernible: in the other, these are merged and untraceable.

BIOLOGY, or the science of living organisation, involves mathematical, physical, and chemical laws, in company with certain others, called vital. It is most usually expounded under the designations Vegetable and Animal Physiology; and in the Concrete departments, Botany, Zoology, and Anthropology.

PSYCHOLOGY, or the Science of MIND, makes a wide transition, the widest that can be taken within the whole circle of the sciences, from the so-called material world, to the world of Feeling, Volition, and Intellect. The main source of our knowledge of mind is self-consciousness; and it is only from

the intimate connection of mind with a living organism, that the subject is a proper sequel to Biology. Not until lately has any insight into mind been obtained through the consideration of the physical organ—the brain; so that Psychology might have been placed anywhere, but for another consideration that helps to determine the order of the sciences—viz., that the *discipline*, or method, of the simpler sciences is a preparation for the more abstruse. Mathematics and Physics especially are an admirable training of the intellect for the studies connected with mind proper, although the laws of Physics may not of themselves throw any direct light on the successions of thought and feeling.

These five sciences embrace all the fundamental laws of the world, and, if perfect, their application would suffice to account for the whole course of nature. To a person fully versed in them, no phenomenon of the explained universe can appear strange; the Concrete sciences and the Practical sciences contain nothing fundamentally new. They constitute a liberal scientific education. It is not uncommon, however, to rank SOCIOLOGY, or the Laws of Man in Society, as a sixth primary science following on Psychology, of which it is a special development.

Dr Neil Arnott, in his work on *Physics*, first published in 1828, gave as the primary departments of Nature—Physics, Chemistry, Life, and Mind (under which he would include the Laws of Society). He did not discard Mathematics, but looked upon it as a system of technical mensuration, created by the mind to facilitate the study of the other sciences, as well as the useful arts. The natural laws expressed by Mathematics are few and simple, and the body of the science consists of a vast scheme of numerical computation, whose value appears in its applications to Astronomy and the other physical sciences.

Auguste Comte, who, in his *Cours de Philosophie Positive*, went over the entire circle of the Theoretical, Abstract, or Fundamental sciences, enumerated these as follows: Mathematics, Astronomy, Physics, Chemistry, Biology, Sociology. He thus detaches Astronomy from Physics, considering it as the abstract science that brings forward and works out the Law of Gravitation. He has no distinct science of Psychology, an omission that has been specially condemned.

Mr Herbert Spencer, in a tract on the *Classification of the Sciences*, takes exception to the scheme of Comte, and proposes a threefold division, according to the gradations of Concreteness in the subject-matter. The first group is termed ABSTRACT SCIENCE, and treats of the *forms* of phenomena detached from their embodiments. The most comprehensive forms are Space and Time; and the sciences corresponding are Mathematics and Logic. The second group is ABSTRACT-CONCRETE SCIENCE, or the phenomena of nature analysed into their separate elements—Gravity in the abstract, Heat in the abstract—as in Physics and Chemistry. These are two of the fundamental sciences in every scheme, and they are called Abstract-Concrete by Mr Spencer, in comparison with the foregoing class. The great principle, of recent introduction, termed the Law of Correlation, Conservation, or Persistence of Force, serves to connect Physics with Chemistry, and imparts to the two taken jointly a greater unity than belongs to Physics singly. The third and last group is CONCRETE SCIENCE, or natural phenomena in their totalities, or as united in actual things—Astronomy, Biology, Psychology, Sociology, Geology, &c. Mr John Stuart Mill, in an article in the *Westminster Review*, April 1865, has described Comte's scheme at length, and also criticised that of Spencer.

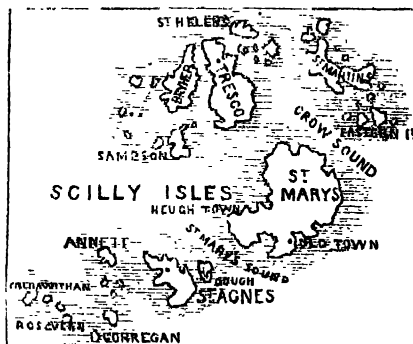
It may be held as generally admitted that Mathematics, Physics, Chemistry, Biology, and Psychology, with or without Sociology, are the sequence of the primary or fundamental sciences, and that the Natural History group, from not containing any new laws of nature, are not fundamental. Astronomy, or the laws of the solar system, and of the other celestial bodies, might be called a Natural History or Concrete science, if we supposed a prior abstract science that discussed the operation of gravity, together with the laws of motion in bodies generally, or without special application to the existing solar and sidereal systems. The first book of Newton's *Principia* would be the Abstract, the third book the Concrete, form of the science.

The Practical Sciences do not admit of any regular classification. They are as numerous as the separate ends of human life that can receive aid from science, or from knowledge scientifically constituted. Connected with Mind and Society, we have Ethics, Logic, Rhetoric, Grammar, Philology, Education, Law, Jurisprudence, Politics, Political Economy, &c. In the manual and mechanical arts, there are Navigation, Practical Mechanics, Engineering Civil and Military, Mining and Metallurgy, Chemistry applied to Dyeing, Bleaching, &c.

The medical department contains Medicine, Surgery, Midwifery, Materia Medica, Medical Jurisprudence. A science of Living, or of the production of Happiness by a skilled application of all existing resources, was greatly desiderated by Plato, and would be the crowning practical science.

SCILLA. See SQUILL.

SCILLY ISLANDS. These islands, situated a little west of 6° W. long., and about 50° N. lat., are the most southern parts of the United Kingdom of Great Britain, if we except the Channel Islands. The group consists of about 40, comprising a circuit of about 30 miles; and their general denomination is derived from a very small island, about an acre in extent, and almost inaccessible, called Scilly, probably from its position near dangerous rocks, similar to that of Scylla near Sicily. By the ancients, these islands



Scilly Islands.

were named Cassiterides, Hesperides, and Silurae Insulae. It would seem that the term Cassiterides, or 'Tin Islands,' under which they were known to the Greeks and Romans, was once applied to the peninsula of Cornwall, or at least before the Roman settlement in Britain, there was some confusion between the S. I. and the peninsula of Cornwall. The inhabitants of Cornwall are said to have brought tin to these islands, where it was shipped off by foreign merchants.

Numerous remains may be seen of rude pillars,

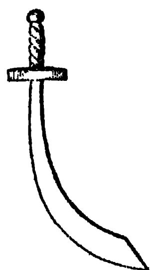
circles of stones, kistvaens, rock-basins, and cromlechs. The granite of which the islands are composed is, in general, of a rather coarse quality, and from its colour, iron seems to be frequently associated with it. There are metalliferous veins, or lodes, in some of the rocks, but none that could have yielded any considerable quantity of ore. The S. I. were in 936 granted by Athelstane to some monks who settled at Tresco. They were afterwards granted to the Abbey of Tavistock by Henry I., and were conferred by Queen Elizabeth on the Godolphin family. They are now the property of the crown.

Only six of the islands are inhabited. St Mary's, the largest, comprises 1528 acres; Tresco, 697; St Martin's, 515; St Agnes (a light-house station), 313; Sampson and Bryher, 269. The inhabitants are chiefly engaged in agriculture. Barley, oats, and a little wheat are grown. Large quantities of potatoes are sent to London and Bristol. Fishing, though not to any great extent, occupies some portion of the population. The climate is mild. The soil is in general sandy, but in Tresco and St Agnes it is remarkably fertile. The cliffs abound with sea-fowl, and are covered with samphire.

St Mary's is the largest of the Scilly group, and exceeds in population all the other islands together. It is nine miles in circumference, and contains about 1500 inhabitants. Hugh Town is the capital, and contains an odd mixture of old-fashioned and neat modern houses. The pier, built in 1750 by Lord Godolphin, has been much improved by Mr Smith, the present lessee of the islands. The custom-house and post-office are in the centre of the town. Some remains of the old church are still seen in the fields, on the southern side of the island. The modern church, at the east end of the main street, is seated on rising ground, and forms a conspicuous object in the panorama of the islands.

At Tresco are the remains of an abbey founded in the 10th century. Among the objects of curiosity on this island are the ruins of Oliver Cromwell's camp, castle, and battery, built by the Parliamentarians under Blake and Ayscough. At Dolphin Down may be seen traces of ancient mining.

St Agnes is about three miles south-west from St Mary's. It is well cultivated, and is surrounded by some fine rock-scenery. The principal attraction is the light-house, 78 feet high, containing a revolving light, seen at a distance of 18 miles.


Scimitar.

SCI'MITAR, a description of sword used among eastern nations. It is considerably curved, and has its edge on the convex side. Being usually of high temper, and its shape favourable to incision, it forms an admirable cutting instrument, but is powerless as a thrusting weapon. The scimitar is not, however, any match for the bayonet.

SCINK, or SKINK (*Scincus officinalis*), a saurian reptile, found in the north of Africa, and in some parts of Asia. It is from six to eight inches long, generally of a reddish-dun colour, with darker transverse bands, a wedge-shaped head, and four pretty strong limbs. It has been in great repute for imaginary medicinal virtues from remote times; it was largely imported on this account into ancient Rome, and is still in high esteem in the East, dried scinks finding a ready sale in many places, as Cairo and Alexandria. There is almost no disease for which it has not been supposed to be a cure.—The S. belongs to the family *Scincidæ*, which is interesting as one of the connecting links between saurians and serpents. The S. itself is in general appearance quite lizard-like; but in some of the allied genera, the limbs


Scink (*Scincus officinalis*).

become rudimentary, or nearly so. In some, one of the pairs is wanting; and even the Slow-worms (*Anguis*) are by many naturalists reckoned in this family, in which the limbs are not manifest externally, although they may be observed on careful dissection. Among the genera in which the four limbs are all externally manifest, although very small and imperfect, is *Seps*, sometimes made the type of a separate family, *Sepsidæ*, in which the body is much elongated and snake-like.

SCINTILLA'TION (Lat. *scintilla*), a term applied to denote the sparkling or flickering of the stars. The phenomenon is not yet quite explained, but that it is certainly due to the earth's atmosphere is proved by the following facts, which embrace nearly all that is known on the subject. If, on a clear evening, we look at a bright star, such as Sirius, we observe that the intensity and colour of its light are constantly changing from great brilliancy to almost total obscurity, from bright red to fine blue, and so on. As it rises above the horizon, these appearances diminish in intensity; and stars near the zenith scarcely scintillate at all. Again, the amount of the scintillation depends upon the character of the weather—on some evenings, all large stars appear to scintillate strongly; on others, there is barely a trace of the appearance. It is commonly said that a planet can be distinguished from a star by the absence of scintillation. This is nearly, but not quite, true; for feeble scintillations have been occasionally observed in Mars and Venus, but very rarely in Jupiter and Saturn. One of the reasons of the non-scintillation of planets seems to be their finite apparent size; for all the more conspicuous planets shew a sensible disc even in a poor telescope, while no instrument that has ever been constructed has shewn a real disc in a star. Thus, a single particle or vesicle of vapour may be large enough to conceal a star for an instant, while it could have no such effect on a planet. It is pretty certain that scintillation is not due to unequally heated masses of air, since it usually modifies only the *appearance*, not the *position*, of a star. Another cause is easily seen in the comparatively feeble light of the planets. It is well ascertained that the scintillation is much less when viewed from the top of a mountain.—For a good idea of what is known, and what we desire still to know, on this subject, see a paper by Professor Dufour, *Philosophical Magazine*, 1860.

SCI'O, one of the most beautiful islands in the Ægean Sea, belongs to Turkey, and lies seven miles

off the coast of Asia Minor, at the entrance to the Gulf of Smyrna. It is 32 miles long, and 18 miles in greatest breadth. Area, 400 sq. m.; pop. about 38,000. It is mountainous in the north, and is extremely fertile. Silk, figs, cheese, wool, and gum-mastic are its principal products; and its wine, which was famous in ancient times, is still esteemed. Kastro, the capital, a thriving and handsome town of 18,800 inhabitants, stands on the east coast, has a harbour, a castle, and two light-houses, and carries on a growing trade in fruits, confectionery, and silk and woollen goods.

In early times, S. formed one of the 12 Ionian states, and it contributed 100 ships to the Greek force that fought and was defeated by the Persians in the sea-fight of Miletus (494 B.C.). In more recent times, the island was taken by the Genoese in 1346, and in 1566 by the Turks, in whose hands it has since, except for a short interval, remained. It was conferred as private property upon the Sultana, enjoyed her protection, and consequently prospered. After it had enjoyed a long period of ease and wealth, a dreadful calamity befell the island at the outbreak of the Greek insurrection. A number of the Sciotes having, in 1822, joined the Samians, who had revolted, the island was attacked by a Turkish fleet and army, and the inhabitants, enervated by peace and wealth, were indiscriminately massacred; 25,000 fell by the sword, 45,000 were sold as slaves, and 15,000 escaped from the island. Subsequently, however, many of the Sciote families returned, and now the island is fast recovering the blow it sustained. Trade is returning; and the vineyards, and the olive, citron, and mastic groves are again flourishing.

SCIO'GRAPHY, the drawing of Sections (q. v.) of buildings, so as to shew the interior of them.

SCIOPPIUS (Latinised form of *Schoppe*), KASPAR, a noted classical scholar and controversialist, was born at Neumark, in the Palatinate, 27th May 1576; studied at Heidelberg, Altdorf, and Ingolstadt; and in 1597, visited Italy, Bohemia, Poland, and Holland. Already he had become celebrated by his Latin verse and his notes upon different Latin authors. Next year, he abjured Protestantism, and became a Roman Catholic, in consequence of which he was decorated by the pope with various titles, and received a pension of 600 florins, together with a residence in the Vatican. Henceforth, his career is a series of fierce onslaughts chiefly on his former co-religionists, but also directed against all whom accident or malice led him to hate. The first person whom he selected for attack was the illustrious Scaliger (q. v.), against whom, in 1607, he launched his *Scaliger Hypobolimæus* (Mainz). In this production, Henry IV. is also assailed. Sent in 1608 by the court of Rome to the diet of Ratisbon, for the purpose of observing the religious condition of Germany, he published in the same year more than twenty pamphlets against the Protestants, recommending the Catholic powers to use every means for their extermination. Such sentiments were, of course, highly satisfactory to the emperor of Germany, who was a devoted Catholic; and, in consequence, S., on visiting Vienna, met with a favourable reception, and was raised to the dignity of count-palatine. In 1611, he fired off two libels against King James I. of England; the first was entitled *Ecclesiasticus Autoritati Ser. D. Jacobi. Mag. Brit. Regis, Oppositus* (Hartberg); and the second, *Collyrium Regium*, &c. Some three years after, when staying at Madrid, he was dreadfully beaten by the domestics of Lord Digby, the English ambassador, in retaliation for the abuse of his sovereign. S. fled from Spain to Ingolstadt, where he issued his *Legatus Latro* against the ambassador. In 1618, S. went to Milan, where he resided for the next twelve years, devoting himself partly to philological studies, and partly to theological warfare. He died, 19th November 1640. S. was a prodigious scholar, and might have rivalled Scaliger himself in reputation, as he did in learning, had it not been for the infirmities of his temper and judgment. To this day, his works, especially those on the Latin language, are reckoned valuable. The principal are: *Poemata Varia* (Heidelb. 1593); *Verisimilium Libri Quatuor*, &c. (Nürnb. 1596); *Suspectæ Lectiones* (Nürnb. 1597); *De Arte Critica* (Nürnb. 1597); *Symbola Critica in Apuleii Opera* (Augsburg, 1605); *Observationes Linguæ Latinæ* (Frankf. 1609); *De Rhetoricarum Exercitationum Generibus* (Mil. 1628); *Grammatica Philosophica, sive Institutiones Grammaticæ Latinæ* (Mil. 1628); *Paradoxa Literaria* (Mil. 1628); *Mercurius Bilinguis*, &c. (Mil. 1628); *Rudimenta Grammaticæ Philosophicæ* (Mil. 1629); *Astrologia Ecclesiastica* (1634); *De Scholarum et Studiorum Ratione* (Pad. 1636); *Mercurius Quadrilinguis* (Basel, 1637), &c.

SCIO'TO, a river of Ohio, U.S., rises in the high lands of the north-west portion of the state, flows south-east to Columbus, then south to its junction at Portsmouth with the river Ohio. It is 200 miles long, flows through a rich valley, is navigable 130 miles, and for 90 miles feeds the Ohio and Erie Canal. It is crossed by seven railways.

SCIPIO, PUBLIUS CORNELIUS, surnamed AFRICANUS MAJOR, one of the most accomplished warriors of ancient Rome, but whose reputation is perhaps somewhat greater than his merits, was born 237 or 234 B.C. He is first mentioned as taking part, though only a youth, in the battle of the Ticinus (218 B.C.), where he saved his father's life. Two years later, he fought at Cannæ as a military tribune, and was one of the few Roman officers who escaped from that disastrous field. In 212 B.C., he was elected ædile, though not legally qualified by age, and in the following year, proconsul, with command of the Roman forces in Spain. His appearance there restored fortune to the Roman arms. By a bold and sudden march, he captured *Nova Carthago*, the stronghold of the Carthaginians, and obtained an immense booty. His humane and courteous manners won over many of the native chiefs; and when he commenced the campaign of 209 B.C., his superiority over his opponents in address, if not in generalship, was manifest. At Bæcula, in the valley of the Guadalquiver, he defeated Hasdrubal with heavy loss, but could not prevent him from crossing the Pyrenees to the assistance of Hannibal. In 207 B.C., he won a more decisive victory over the other Hasdrubal, son of Gisco and Mago, at an unknown place called Silpia, or Elinga, somewhere in Andalusia—the effect of which was to place the whole of Spain in the hands of the Romans. Soon after, he returned to Rome, where he was elected consul (205 B.C.), though he had not yet filled the office of prætor; and in the following year he sailed from Lilybæum, in Sicily, at the head of a large army, for the invasion of Africa. His successes compelled the Carthaginian senate to recall Hannibal from Italy. This was the very thing that S. desired, and had laboured to achieve. After some abortive efforts at reconciliation, the great struggle between Rome and Carthage, between S. and Hannibal, was terminated by the battle fought at Naragra, on the Bagradas, near Zama, 19th October 202 B.C., in which the Carthaginian troops were routed with immense slaughter. Hannibal advised his countrymen

to abandon what had now become a hopeless and ruinous contest, and his advice was taken. Peace was concluded in the following year, when S. returned to Rome, and enjoyed a triumph. The surname of AFRICANUS was conferred on him; and so extravagant was the popular gratitude, that it was proposed to make him consul and dictator for life, honours that would have been the destruction of the constitution, but which S. was either wise enough or magnanimous enough to refuse. When his brother, Lucius, in 190, obtained the command of the army destined to invade the territories of Antiochus, S. served under him as legate; in fact, it was only when he offered to do so, that the senate granted Lucius the province of Greece. The latter was victorious in the war, and on his return to Rome (189 B.C.), assumed (in imitation of his brother) the surname of ASIATICUS. But the clouds were now gathering heavily round the Scipios. In 187 B.C., Cato Major and others induced two tribunes to prosecute Lucius for allowing himself to be bribed by Antiochus in the late war. He was declared guilty by the senate; his property was confiscated; and he himself would have been thrown into prison, had not his brother forcibly rescued him from the hands of the officers of justice. In 185 B.C., S. himself was accused by the tribune, M. Nævius; but instead of refuting the charges brought against him (and which were probably groundless), he delivered, on the first day of his trial, a eulogy on his own achievements, and opened the second day by reminding the citizens that it was the anniversary of the battle of Zama, and therefore not a time for angry squabbling, but for religious services. He then summoned the people to follow him to the Capitol, to give thanks to the immortal gods, to pray that Rome might never want citizens like himself. His audience were electrified, and the thing was done before opposition became possible. To resume the trial, was out of the question; but S. felt that popular enthusiasm was not to be depended on; that the power of the oligarchy—of that compact body of ambitious and exclusive nobles—was irresistible; that its hatred of him was unappeasable, and that his day was over. He retired to his country-seat at Liternum, in Campania, where he spent the remainder of his life, and where he died, 183 or 185 B.C.—S. is commonly regarded as the greatest Roman general before Julius Cæsar; and certainly, in the brilliancy of his gifts and accomplishments, he was unsurpassed; but if his career be strictly criticised, it will be found that he owed as much to fortune as to genius. Nevertheless, he won a multitude of splendid successes, and made the most of his great advantages. His beauty, bravery, and courtesy; his proud, yet pious belief that the gods favoured him with their inspiration, won him the love and reverence of soldiers and women; and his magnanimity towards his fallen rival, who flitted about the eastern courts in dreary exile, is a bright feature in his character, and nobly distinguishes him from the cruel-hearted oligarchs of the senate.

SCIPIO ÆMILIANUS, PUBLIUS CORNELIUS, surnamed AFRICANUS MINOR, born 185 B.C., was a younger son of Lucius Æmilius Paulus, who conquered Macedon, but was adopted by his kinsman, Publius Scipio, son of the great Scipio, who had married the daughter of that Lucius Æmilius Paulus who fell at Cannæ. S. accompanied his father on his expedition against Macedon, and fought at the decisive battle of Pydna, 168 B.C. In Greece, he made the acquaintance of Polybius the historian, who afterwards became one of his closest and most valued friends. In 151 B.C., he went to Spain as military tribune, in the wake of the consul Lucius Lucullus, where he distinguished himself alike by his valour and his virtue. Two years later, began the third and last Punic war, which mainly consisted in the siege of Carthage. S. still held the subordinate position of military tribune; but the incapacity of the consuls, Manius Manilius and Lucius Calpurnius Piso, and the brilliant manner in which he rectified their blunders, fixed all eyes upon him. The favourite both of the Roman army and the Roman people, S. was at length, in 147 B.C., when only a candidate for the ædileship, elected consul by an extraordinary decree of the Comitia, and invested with supreme command; old Cato, who could with difficulty be got to praise any one, applying to the young hero and his incapable comrades (according to Plutarch) the Homeric line—

> He only is a living man; the rest are flitting shades.

The story of the siege of Carthage, the despairing heroism of its inhabitants, the determined resolution, the sleepless vigilance, the incessant labours of S., are too well known to require description. Suffice it to say, that after a protracted defence of months, the city was finally taken by storm in the spring of 146 B.C.; and by the orders of the senate, it was levelled to the ground, and the ploughshare driven over its site. S., a man of noble and refined soul, obeyed the savage behest with sorrow, even with horror. As he gazed on the ruin he had wrought, the thought flashed across his mind that some day Rome too might perish, and the words of the *Iliad* rose to his lips—

> The day shall come when sacred Troy shall perish,
> And Priam and his people shall be slain.

S., though probably the most accomplished Roman gentleman of his age, was rigorous in his observance of the antique Roman virtues; and when holding the office of censor in 142 B.C., he strove to follow in the footsteps of Cato. But his efforts to repress the increasing luxury and immorality of the capital were frustrated by the opposition of his colleague, Lucius Mummius, the rough conqueror of Corinth. In 139 B.C., S. was accused of the *crimen majestatis* by the tribune Tiberius Claudius Asellus, but was acquitted, and soon after was sent to Egypt and Asia on a special embassy. Meanwhile, however, affairs had gone badly in Spain. Viriathus, the Lusitanian patriot, had again and again inflicted the most disgraceful defeats on the Roman armies, and his example had roused the hopes of the Celtiberian tribes, who also rushed to war against the common foe. The contest continued with varying success; but the interest centres in the city of Numantia, whose inhabitants displayed amazing courage in the struggle with Rome. For long it seemed as if the Numantines were invincible—one consul after another finding their subjugation too hard a task—but at length, in 134 B.C., S., re-elected consul, was sent over to Spain; and after a siege of eight months, forced the citizens, who were dying of hunger, to surrender, and utterly destroyed their homes. He then returned to Rome, where he took a prominent part in political affairs, appearing as the leader of the aristocractic party, in consequence of which his popularity with the democratic party greatly declined. Although a brother-in-law of Tiberius Gracchus, whose sister, Sempronia, he had married, he rather disclaimed any sympathy with his political aims; and when he heard of the murder of his kinsman, quoted his favourite Homer: 'So perish all who do the like again.' His attempt (129 B.C.) to rescind that portion of the agrarian law of Tiberius Gracchus relating to the lands of the *Socii*, excited the most furious indignation. When he went home from

the senate, he had to be accompanied by a guard. Next morning, he was found dead in his bed; the prevailing suspicion being, that he was murdered either by or at the instigation of Papirius Carbo, his most rancorous political enemy. S. was neither a rigid aristocrat nor a flatterer of the people. Inferior in splendour of genius to his adoptive grandfather, he surpassed him in purity of character, in simplicity of patriotism, and in liberality of culture.

SCI'RPUS, a genus of plants of the natural order *Cyperaceæ*. The English name Club-rush is sometimes given to them. The Common Bulrush (q. v.) is a familiar example. There are several British species, some of them very small in comparison with the Bulrush, as *S. cæspitosus*, called *Deer's Hair* in the Highlands of Scotland, which is only two or three inches high, and abounds in moors, affording food to sheep in spring. The root-stocks of *S. dubius* are eaten by the natives of the south of India; as are the tubers of *S. tuberosus*, which is called *Pi-tsi* by the Chinese, and is cultivated by them in tanks and ponds, copious supplies of manure being given. The tubers are roundish.

SCI'RRHUS (Gr. hard), a term applied to a kind of Cancer (q. v.).

SCITAMI'NEÆ, or ZINGIBERA'CEÆ, a natural order of endogenous plants, herbaceous perennials. There are about 250 known species, among which are the different kinds of Ginger, Galangale, Zedoary, Cardamom, Grains of Paradise, Turmeric, &c. Most of them are notable for their aromatic properties, which reside chiefly in their root-stocks or in their seeds. The root-stocks of some, particularly when young, contain much starch, which is used as arrow-root. All the species are tropical or subtropical.

SCIU'RIDAE. See SQUIRREL.

SCLERODE'RMI, Cuvier's name for the family of fishes called *Balistidæ* by Müller. See BALISTES.

SCLEROGE'NIDAE. See MAILED CHEEKS.

SCLERO'STOMA (from the Gr. *scleros*, hard, and *stoma*, the mouth) is the term applied to a well-known genus of the family of *Strongylidæ*, belonging to the order of round worms or Nematoda (q. v.). One species, the *Sclerostoma syngamus*, is of special interest, as being the cause of the disease in poultry known as the Gapes (q. v.). Since the article GAPES was published, it has been ascertained that the entozoon which infests the windpipe of the diseased birds is not a trematoid (or fluke-like) worm, but a round worm, possessing many very singular properties. Dr Cobbold, to whom we are mainly indebted for our knowledge of this worm, removed from a chloroformed fowl with the gapes, seven sclerostomata. 'Six of these parasites were united in pairs, the odd worm being a female, from which the male had in all likelihood been rudely torn during the withdrawal of the forceps' (*Entozoa*, 1864, p. 86). The females thus extracted had an average length of $\frac{4}{5}$ths of an inch; while the males scarcely exceeded $\frac{1}{5}$th of an inch. In both sexes, the breadth of the body was nearly uniform throughout, being about $\frac{1}{36}$th of an inch in the female, and only $\frac{1}{76}$th of an inch in the male. The mouth of the female is furnished with six prominent chitinous lips. According to Siebold, after sexual congress, 'there is ultimately a lasting continuity of the sexes by means of an actual growing together'—one of the most remarkable facts ever recorded in natural history. Hence the eggs, which are comparatively large, and many of which contain fully-formed embryos, can only escape by a breaking-up of the body of the parent. 'By whatever mode,' says Dr Cobbold, 'the young make their *exit* from the shell, it is manifest, that prior to their expulsion, they are sufficiently developed to undertake an active migration. Their next habitation may occur within the bodies of certain insect larvæ, or even in small land molluscs; but I think it more likely that they either enter the substance of vegetable matters, or bury themselves in the soil at a short distance from the surface.'



Fig. 1.—Sclerostoma syngamus.
a, Male and female—natural size; *b*, upper part of the same, enlarged (from Cobbold). The male is the smaller worm on the right side of these figures.

Considering that this worm infests the trachea of the domestic fowl, the turkey, the pheasant, and the partridge, as well as of many birds of less importance (as the magpie, the black stork, the starling, the swift, &c.), it is of the greatest importance to check its development. With this view, the worms must not only be removed by the means described in the article GAPES, and more fully in Cobbold's *Entozoa*, pp. 90, 91, but they must be *totally destroyed* after their removal. If they be merely killed, and thrown on the ground, the mature eggs will probably remain uninjured; and when decomposition sets in, the young embryos will, sooner or later, escape from the shells, migrate in the soil or elsewhere, and ultimately find their way—how, we cannot tell—into the air-passages of certain birds, in the same manner as their parents did before them.

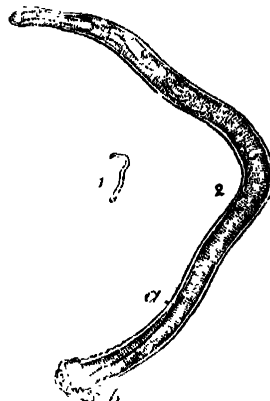


Fig. 2.—Sclerostoma duodenale—Male specimen.
1, The natural size; 2, the same magnified, and seen laterally; *a*, generative organ; *b*, region of anus.

Dr Cobbold, whose classification of intestinal worms will doubtless for many years be the standard one, places the *Dochmius anchylostomum*, or *Anchylostoma duodenale* (see STRONGYLIDÆ), in this genus, with the name of *Sclerostoma duodenale*. This worm, which usually measures about $\frac{1}{3}$d of an inch in length, is especially characterised by an asymmetrical disposition of four horny, conical, oval papillæ, of unequal size, forming the so-called teeth. The female is larger than the male in about the ratio of

4 to 3, and is the more numerous in the ratio of 3 to 1. This worm was first discovered by Dubini at Milan in 1838, and though at first thought rare, is now known to be tolerably common throughout Northern Italy. It is remarkably abundant in Egypt, where Pruner found it in nearly every corpse, sometimes, in hundreds of specimens, in the jejunum, and to a less extent in the duodenum. Griesinger, in his Memoir *On the Frequency of Entozoa in Egypt, and the Diseases they occasion* (1854), considers that about one-fourth of the population are constantly suffering from a severe anæmic chlorosis, occasioned solely by the presence of this parasite. A tolerably full account of this disorder, and of the treatment to be adopted, is given by Küchenmeister in his *Manual of Parasites*, vol. i. pp. 386—389.

SCLERO'TIUM, a spurious genus of fungi, now regarded as merely the mycelium of fungi, and these probably of very different kinds, which have been arrested in their development, assuming a peculiar form. This form is that of a fleshy mass, often a ball. Examples are to be found among almost all kinds of decaying vegetable matter, as fruits, esculent roots, &c. When a crop of onions rots off, as is often the case, to the vexation of the gardener, a S. will generally be found attached to the bulbs in the form of little irregular black masses, or as a multitude of small granules. On the under side of decaying cabbage-leaves, and scattered on the ground beneath the plant to which they belong, may in like manner be seen little balls, varying from white or reddish-brown to dark brown and black, in size about equal to cabbage seeds, whence stories of showers of seeds have sometimes originated.

SCO'LEX. See TAPE-WORMS.

SCOLOPA'CIDÆ, a family of birds of the order *Grallæ*, having a long, feeble, soft, and somewhat flexible bill, which is remarkably furnished with nerves, particularly towards the tip, so as to be extremely sensitive, whilst many of them have also a peculiar muscle, enabling them to separate the points of the mandibles the moment that their prey is felt. They are thus admirably fitted for seeking their food—which generally consists of worms, slugs, &c.—in mud, soft earth, or wet sand. The membrane of the tip of the bill is almost pulpy in many of them. The species are numerous, and very widely distributed, generally inhabitants of swampy or very moist places. Snipes, woodcocks, sandpipers, and curlews are familiar examples.

SCOLOPE'NDRA. See CENTIPEDE.

SCOLOPE'NDRIUM. See HART'S TONGUE.

SCOLY'TUS, a genus of coleopterous insects of the family *Xylophagi*. See BARK-BEETLE. One



Scolytus destructor, and Section of Wood, shewing the burrows of the larvæ.

species, *S. destructor*, a beetle only about one-sixth of an inch in length, of a dull colour, with short antennæ, thickened at the extremity, has of late years destroyed great numbers of fine elms in the neighbourhood of London and elsewhere in England. The female insect burrows in the wood, and lays a row of eggs; the larvæ, as soon as they are hatched, begin to feed upon the wood, and eat their way in long tunnels, diverging on all sides from the original one. This pest appears to be spreading in England.

SCOMBERESO'CIDÆ, a family of fishes, of the order *Plectognathi*, having the maxillary bones united with the elongated premaxillaries at the corners of the mouth. The Flying-fish (*Exocœtus*) belongs to this family. The Gar-fish and the Saury Pike are the only species common on the British coasts. Until the Plectognathi were recognised as a separate order, the S. were reckoned as belonging to the *Esocidæ*, or pike family.

SCOMBE'RIDÆ, or SCO'MBRIDÆ, a large family of acanthopterous fishes, containing many species highly esteemed as articles of food, and some of them of great value on account of the abundance in which they are caught. Some of them attain a large size. They have a smooth body, covered generally with small scales, and often very beautifully coloured; the tail-fin generally large, and the tail very muscular and powerful. The gill-covers have no armature. The sides of the tail are often keeled and armed with sharp-keeled scales. The front spines of the anal fin are generally detached, and sometimes those of the first dorsal fin. The second dorsal fin is often represented by numerous finlets, as in the Mackerel (q. v.). To the same tribe with the mackerel, characterised by finlets and by the want of armature on the lateral line, belong the Bonito (q. v.), the Tunny (q. v.), the Albacore (see TUNNY), and the Seirfish (q. v.). The importance of the Mackerel fishery is well known, also that of the Tunny fishery of the Mediterranean. The Sword-fish (q. v.) is an example of another group, comprising only a few species, having no finlets, and remarkably characterised by the dagger-like prolongation of the muzzle. The Pilot-fish (q. v.) belongs to a tribe having the first dorsal represented by isolated spines. There are other tribes or groups, some having the lateral line cuirassed, some not having this armature, and not having finlets nor detached spines. The Dory (q. v.) and allied genera, often regarded as forming a tribe of S., have been constituted into a distinct family, *Zeidæ*. The S. are all marine. They are more numerous in warm than in cold climates, although some are found in very northern seas, of which the mackerel is the most important instance. It and the Scad (q. v.), or Horse Mackerel, are the only species common on the British coasts, although several others are known as of rare occurrence.

SCONCE, in Fortification, is a term applied to any small redoubt or fort, detached from the main works for some local object, as the defence of a pass or ford, &c. The word is not now often used.

SCONCE, a candlestick affixed to a wall by a bracket, and frequently with a mirror or other reflector.

SCONE (pronounced *Scoon*), a parish in Perthshire, lying on the left bank of the Tay, about two miles from Perth. It is famous as the seat of one of the most venerable of Scottish abbeys. S. is first mentioned in the beginning of the 10th c., when a council was held there in the 6th year of the reign of King Constantine, at which time it is styled, by the Chronicle which records the fact, *regalis civitas*, the royal city. A monastery was built at S. probably about the same period, and thither the stone seat was brought from Iona on which the kings of the Scots were inaugurated, and

which was carried by Edward I. of England to Westminster Abbey. In place of the ancient monastery, an abbey of Canons Regular was founded by Alexander I., in 1115, and there the sovereigns continued to be inaugurated and crowned. Alexander III., the last of the ancient race of kings, and Robert Bruce, the founder of the new dynasty, were crowned at S.; but after the accession of the House of Stuart, the coronation sometimes took place in other churches. In the summer of 1559, when Perth was held by the Lords of the Congregation, a disorderly multitude of their adherents assaulted the monastery of S., set it on fire, and left it a blackened ruin. The last coronation which was celebrated at S. was that of Charles II., on the 1st of January 1651. The abbey-church had never been restored, and the solemnity took place in the parish kirk, the crown being placed on the king's head by the Marquis of Argyle. In January 1716, the Jacobite leaders endeavoured to encourage their followers by fixing a day for the coronation of the Chevalier at S., but the design was abandoned. In the reign of James VI., the abbey of S. was erected into a temporal lordship in favour of Sir David Murray, afterwards created Viscount of Stormont. The great chief-justice, the Earl of Mansfield, a younger son of the fifth Viscount Stormont, was born at S.; and the Scottish peerage is now merged in the British earldom. The Viscounts of Stormont had a residence near the site of the abbey, and hence known as the Palace of Scone. The present palace was erected on the same site in the beginning of this century.

SCO'PAS, a celebrated Greek sculptor and architect, belonging to the later Attic school, the head of which was Praxiteles (q. v.), was born in the island of Paros, and flourished during the first half of the 4th c. B.C. Nothing is known regarding his life or the period of his death. His principal architectural works are: 'The Temple of Athena Alla at Tegea,' the first both in point of size and beauty in the Peloponnesus; 'The (second) Temple of Diana at Ephesus' (though Deinocrates is also and even more generally named as the architect of this building); some of the bas-reliefs in the famous Mausoleum erected by Artemisia, queen of Caria, in memory of her husband (and now in the British Museum). His sculptures, by which we mean his single statues and groups illustrating the divinities of Greek mythology, were very numerous, and for the most part were executed in marble. They embrace subjects from the myths of Aphrodite (Venus), Dionysus (Bacchus), Apollo, Artemis (Diana), &c. But perhaps the noblest and certainly the most famous piece of sculpture executed by S., was that which latterly stood in the Flaminian Circus at Rome, and represented Achilles conducted to the island of Leuce by the divinities of the sea. It included statues of Neptune, Thetis, the Nereids, Tritons, and a variety of sea-monsters, and according to Pliny, the whole was so beautiful, that it would have been sufficient to have immortalised S., even if he had done nothing more.

SCOPE'LIDÆ. See SALMONIDÆ.

SCORE, in Music, compositions for several voices or instruments, or for an orchestra, so written, that each part has a separate staff for itself, these staves being placed over each other, bar corresponding to bar. It is so called because the bars are *scored* or drawn through all the parts from top to bottom. Occasionally, where there is a deficiency of staves for all the parts, or where any of the parts have so little to do that it is not worth while to assign them a separate staff, parts related to or connected with each other, as two flutes, two clarionets, or three trombones, may be written on the same staff together. The arrangement or distribution of the parts in a score is matter of some importance. As a general rule, the highest part should be placed uppermost, then the next lower, and gradually descending. All the parts of a chorus should be placed together. Perfection in reading score is not very easily attained, but is necessary for a thoroughly trained musician. The student of music who can read or play the great master-works from the score, will become far more intimately acquainted with them than he could by mere pianoforte arrangements, and will come to understand the means by which their composers have produced the wonderful effects that are to be found in their music. The use of so large a number of clefs, and the practice which has obtained of writing parts for particular instruments in other keys, have added greatly to the difficulty of studying the score. Among various suggestions for simplifying the score, one which was lately advocated in Brown's *Elements of Musical Science*, consists in the use of but one clef, the bass or F clef, the other parts being distinguished from the bass by short bars attached to the clef, which direct the performer to take the notes one, two, or three octaves higher.

SCORESBY, WILLIAM, D.D., a celebrated Arctic explorer and savant, was the son of William Scoresby, the most distinguished whale-fisher of his time, and was born at Cropton in Yorkshire, October 5, 1789. He commenced a seafaring life at the age of ten, and in his 21st year succeeded his father as commander of the *Resolution*, and carried on the business of whale-fishing. After having made 17 voyages to the Spitzbergen and Greenland whaling-grounds, he published the results of his observations of the countries within the Arctic Circle in *An Account of the Arctic Regions* (2 vols., 1820), a work which not only increased and extended the author's reputation, but added largely to the sciences of meteorology, hydrography, and natural history. In 1822, he explored the east coast of Greenland, a tract hitherto wholly unknown, and published in the following year at Edinburgh an account of this expedition and its fruits. In 1824, he was elected a Fellow of the Royal Society of London, and some time after was chosen *correspondant* of the French Institute. He had retired from his profession in 1822, and now proceeded to give effect to a strong desire which had long possessed him, of becoming an authorised teacher of religion, by entering himself at Queen's College, Cambridge; he graduated as B.D. in 1834, subsequently (1839) received the degree of D.D., and laboured faithfully and zealously, first at Liverpool and afterwards at Bradford, till failing health compelled him to retire to Torquay. He still continued his physical researches, giving special attention to terrestrial magnetism, especially in its relation to navigation; and published the results, many of which were of great value and interest, in the form of Memoirs, in the *Philosophical Transactions*, the *Transactions of the Royal Society of Edinburgh*, the *Reports of the British Association*, and subsequently in an improved form in his *Magnetical Investigations* (Lond. 2 vols. 1839—1852). For the better prosecution of these researches, he made a voyage to the United States in 1847, and to Australia in 1853, returning from the last-named country in 1856, enfeebled in health by the arduous labours which he had undergone. He died at Torquay on March 21, 1857. Besides his work on *Zoistic Magnetism*, which described a series of researches entered into for the purpose of eliciting some natural connection between magnetic and mesmeric agencies, he published various works of a religious nature.

His life has been written by his nephew, R. E. Scoresby-Jackson (Lond. 1861).

SCO'RIÆ are the cinders and slags of volcanoes, more or less porous from the expansion of the gases contained in the melted materials. See VOLCANIC ROCKS.

SCORPÆ'NA, a genus of fishes, of the family of *Mailed Cheeks*. The head is large and compressed, more or less armed with spines or tubercles. The body is of a somewhat perch-like form. Some of the *Scorpænæ* are remarkable for their ugliness; some exhibit very fine colours. They are numerous in the Mediterranean, and widely distributed in the seas of warm climates. They frequent rocky shores in shoals, and feed on crustaceans, small fishes, &c. They are popularly called *Hog-fish* and *Scorpion-fish*. The flesh is dry and tasteless, but the liver yields a useful oil.—The Bergylt (q. v.) belongs to a nearly allied genus.

SCO'RPION (*Scorpio*), a genus of *Arachnida*, of the order *Pulmonaria*, formerly including the whole of the family *Scorpionidæ*, to all of which the popular name is still extended. Scorpions are natives of warm climates, both in the eastern and western hemispheres. The species are numerous. They have the body elongated, and no marked division between the thorax and abdomen. Six segments of the abdomen are broad; but the last six are narrow, forming a tail; and the last segment is modified into a curved and sharp sting, having two pores on its lower side, from which the venom flows, supplied by two poison glands in the base of the segment. The palpi are modified into pincers or claws like those of the lobster, by means of which prey is seized. There are four spiracles or breathing pores on each side of the abdomen. There are two remarkable comb-like appendages on the under surface of the thorax, the use of which is unknown. The number of eyes is various; in the restricted genus *Scorpio*, of which the COMMON S. (*S. Europæus*) of the south of Europe is an example, there are only



Scorpion (*Scorpio Europæus*).

six; but in some of the genera eight and twelve. Scorpions feed on beetles and other insects, and after seizing them, pierce them with the sting before eating them. They also eat the eggs of spiders, &c. They lurk under stones and in holes and crevices, but come forth to seek their prey, running with great activity. In running, they carry the tail curled over the back. When alarmed or irritated, they shew great fierceness, evidently aware of the power of their sting, and moving it in all directions, as if threatening an adversary. They are universally disliked, and not a little dreaded, being apt to get into houses, and into beds, hiding themselves under pillows, in shoes, boots, &c., so that accidents are very frequent in countries where they abound. The sting of a S. is seldom fatal, but even that of the Common European S. is very painful, and that of some of the largest species—which are six inches long—is much more severe, attended with much nausea and constitutional derangement, nor do the effects soon cease. It is of use to press a large key or other tube on the wound, so as to force out part of the poison. The best remedy is ammonia, internally administered, and also applied externally.

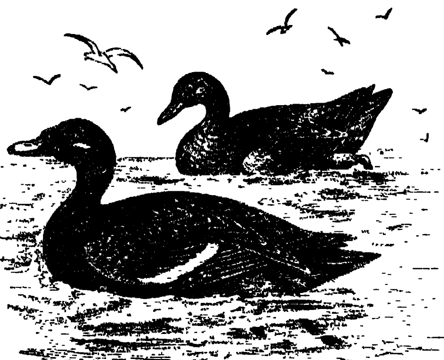
The female S. displays great regard for her young, which she carries for some time clinging in great numbers to her back, limbs, and tail.

SCORZONE'RA, a genus of plants of the natural order *Compositæ*, suborder *Cichoraceæ*, having yellow or rarely rose-coloured flowers. The species are numerous, mostly natives of the south of Europe and the East. No species is found in Britain. The Common S. of our kitchen-gardens, *S. Hispanica*, a native of the south of Europe, has long been cultivated for its esculent roots. The root is black externally, white within, about the thickness of a man's finger, long, and tapering very gradually, whence the name *Viper's Grass*, sometimes given to the plant, the root being supposed to resemble a viper. It contains a white milky juice, and has a mild sweetish mucilaginous taste; it is very pleasant when boiled, the outer rind being first scraped off, and the root steeped in water, to abstract part of its bitterness. The leaves are an inferior substitute for mulberry leaves in feeding silkworms.—Other species of S. are used in the same way.

SCOT, REGINALD, a writer who has acquired an honourable reputation as an early disbeliever in the reality of witchcraft, was a younger son of Sir John Scot of Scotshall, near Smeethe in the county of Kent, and was born in the first half of the 16th century. He studied at Oxford, and on his return home devoted himself exclusively to learned pursuits. Nothing further is known regarding him except that he died in 1599. His famous work, entitled *The Discoverie of Witchcraft*, was published in 1584, and is designed to demonstrate the absurdity of the prevalent belief on the subject. It is full of learning, and is marked in many passages by sound sense and humane feeling, qualities that naturally excited the antipathy of a person like King James, who wrote his *Dæmonology*, as he tells us, 'chiefly against the damnable opinions of Wierus and Scot; the latter of whom is not ashamed in public print to deny there can be such a thing as witchcraft.' But the 'British Solomon' only reflected the general ignorance and superstition of his age, and S. had to run the gantlet of a series of 'Answers' and 'Refutations' by a number of 'eminent' divines, as well as by Glanvil, the author of the *Scepsis Scientifica*. S.'s book was ordered to be burned by the common hangman, and copies of it are now extremely rare. Besides *The Discoverie of Witchcraft*, S. wrote *A Perfect Platform of a Hop Garden*.

SCOTCH STATUTES frequently mean the ancient acts of parliament beginning with the reign of James I. of Scotland, and continuing down to the Union of England and Scotland. There are also many statutes passed since that date which are applicable exclusively to Scotland, and these are to be found among the statutes at large. The rules of construction of Scotch statutes do not differ from those affecting English or British statutes. One peculiarity, however, distinguishes the old Scotch statutes prior to the Union, which is this, that those statutes lost their force by desuetude, that is, by mere lapse of time, coupled with neglect or non-observance, or at least with a contrary usage. In England, on the other hand, a statute, however ancient and however little acted upon, continues law until it is expressly, or by strong implication, repealed by some subsequent statute. Acts of Sederunt—that is, rules of practice passed by the Court of Session—are also subject to the law of desuetude.

SCO'TER (*Oidemia*), a genus of the oceanic section of ducks, having a short broad bill with an elevated knob at the base of the upper mandible, the tip much flattened, and terminated by a large flat nail, the mandibles laminated with broad strong widely separated plates; the wings of moderate length; the tail short and acute; the feet very large; the plumage generally very dark. Their food consists chiefly of marine shell-fish, crustaceans, &c. They obtain their food by diving.—The COMMON S., or BLACK S. (*O. nigra*), is about the size of the common duck. The whole plumage of the male is deep black; the bill and legs are also black, except a line of orange along the ridge of the upper mandible. The female is dark brown. The black S. is abundant in winter on many parts of the British coast, migrating to more northern regions in spring. The flesh is oily, and has a fishy taste; but being therefore permitted to Roman Catholics during Lent, is in great request in some countries, so that at Marseille, Aix, and other places in the south of France, arrangements are made by the magistrates



Velvet Scoter (*Oidemia fusca*).

for an annual shooting or *battue* of scoters, and great numbers are killed.—The VELVET SCOTER (*O. fusca*) is a less common winter visitant of Britain, plentiful only in Orkney.

SCO'TIA. See MOULDING.

SCO'TLAND. For the Geography, see GREAT BRITAIN. *History*.—An account has been given under the article Picts (q. v.) of the early inhabitants of the country which has long been known by the name of Scotland. The original Scotia or S. was Ireland, and the Scoti or Scots, at their first appearance in authentic history, were the people of Ireland. The Scots were a Celtic race, and their original seat in Northern Britain was in Argyle, which they acquired by colonisation or conquest, before the end of the 5th c., and from whence they spread themselves along the western coast from the Firth of Clyde to the modern Ross. The name of S. seems first to have been given to the united kingdom of the Picts and Scots in the 10th century. It was then sometimes styled, by way of distinction, *Scotia Nova* (New Scotland), and it was a considerable time afterwards before the name of S. was applied to it, to the exclusion of Ireland. This interchange of names was a fruitful source of dispute between Irish and Scottish writers in the 16th and following centuries, and it can hardly be said that even now the controversy is entirely at an end.

The first prince of the British Scots mentioned in our authentic annals was Fergus, son of Erc, who crossed over to Britain about the year 503. His nation had been converted to Christianity by St Patrick, and Fergus himself is said to have received the blessing of the saint in his early years. His great-grandson, Conal, was king of the British Scots when Columba (q. v.) began the conversion of the Northern Picts; and by that prince, according to the best authorities, Iona was given for the use of the mission. Conal was succeeded by his nephew, Aidan, who was inaugurated as sovereign by St Columba in the island of Iona—a ceremony which Scottish writers, misled by the great French antiquary Martene, long believed to be the first example of the benediction of kings. Aidan was a powerful prince, and more than once successfully invaded the English border, but towards the end of his reign he received a severe defeat from the Northumbrian sovereign Ethelfrid at the battle of Degsestan.

The history of Aidan's successors is obscure and uninteresting, except to the professed students of our early history. Their kingdom was overshadowed by the more powerful monarchy of the Picts, with which, as well as with its neighbours in the south—the Britons of Cumbria—it was engaged in almost unceasing conflict. The Scots were for a time under some sort of subjection to the English of Northumbria, but recovered their independence on the defeat and death of King Egfrid in battle with the Picts at Nechtansmere in 685. In the middle of the 9th c., by a revolution, the exact nature of which has never been ascertained, the Scots acquired a predominance in Northern Britain. Kenneth, son of Alpin, the lineal descendant of Fergus and Aidan, succeeded his father as king of the Scots in 836. The Pictish kingdom was weakened by civil dissension and a disputed claim to the crown. Kenneth laid claim to it as the true heir in the female line, and was acknowledged king in the year 843.

King Kenneth transferred his residence to Forteviot in Strathern, which had been the Pictish capital, fixing soon afterwards the ecclesiastical metropolis of the united kingdom at Dunkeld, where he built a church, dedicated to St Columba. The Picts and Scots, each speaking a dialect of the Celtic tongue, gradually coalesced into one people, whose territory extended from the Firths of Forth and Clyde to the northern extremity of Britain. The crown descended to a line of princes of the family of Kenneth, whose rule gave a unity and comparative tranquillity to the Scots of Britain, which those of Ireland, at no time really united under one prince, never possessed, and the good effects of which, as contrasted with the state of the sister island, are experienced to the present day. The first interruption to the descent of the crown in the line of Kenneth was the reign of a usurper named Grig, round whose name, amplified to Gregory by the writers of a later age, a cloud of legendary fiction gathered. The old family was restored on his expulsion in 893.

The reign of Constantine, son of Aodh, who succeeded in 904, was a remarkable one. In his time, it is probable that the seat of the ecclesiastical primacy was transferred from Dunkeld to St Andrews, and that the regal residence was fixed at Scone. At the latter place, in the sixth year of his reign, the chronicles mention that Constantine, the king, Kellach, the bishop, and the Scots, swore to observe the laws and discipline of the faith and the rights of the churches and the gospels. This seems to indicate the meeting of some sort of council, civil or ecclesiastical, or more probably a combination of both, according to the form prevalent at this period both among the Celtic and the Teutonic nations. Even before the establishment of the kingdom of the Picts and Scots in the person of Kenneth,

Northern Britain had experienced the attacks of a new enemy, the Scandinavian invaders, generally spoken of under the name of Danes. Constantine resisted them bravely, but towards the end of his reign he entered into an alliance with them in opposition to the English. A powerful army, composed of Scots and Picts, Britons and Danes, disembarked on the Humber, and was encountered at Brunanburgh by Athelstane, king of England. A battle was fought there, the first of a series of unfortunate combats by Scottish princes on English ground. The confederate army was defeated, and though Constantine escaped, his son was among the slain. Weary of strife, the king soon afterwards retired to the Culdee monastery at St Andrews, of which he became abbot, and where he died in 953.

During the reign of Malcolm the first of that name, and the successor of Constantine, a portion of the Cumbrian kingdom, including the modern Cumberland and part of Westmoreland, which had been wrested from the Britons by Edmund, king of England, was bestowed by that prince on the Scottish sovereign. This grant was the foundation of that claim of homage made by the English kings on the Scottish sovereigns, which afterwards became the cause or the pretext for the great struggle between the two nations. The northern kingdom was still further increased in the reign of Kenneth, son of Malcolm, by the acquisition of Lothian, and of Northern Cumbria, or Strathclyde. The former province, formerly a part of the Northumbrian kingdom, and entirely English in its population, was bestowed on Kenneth by Edgar, king of England. The Cumbrian kingdom, which had at one time extended along the west coast from the Firth of Clyde to the border of Wales, had been weakened by the loss of its southern territories; and it now fell under the dominion of the Scottish king. The last addition to Scotland in the south took place under Malcolm II., son of Kenneth, who acquired the Merse and Teviotdale from the Earl of Northumbria, and thus advanced his kingdom on the eastern border to the Tweed. The reign of Malcolm II. extended from 1003 to 1033. The kings who immediately followed are better known to the general readers than any of their predecessors, poetry having made their names familiar to every one. Malcolm's successor was his grandson, Duncan, whose brief reign was followed by that of Macbeth (q. v.). The latter was a vigorous and prudent ruler, munificent to the church, and famous as the only Scottish king who made a pilgrimage to Rome. But although by marriage he was connected with the royal line, he was unable to secure the affection of his subjects. Malcolm, the eldest son of Duncan, assisted by his kinsman, Siward, Earl of Northumbria, invaded Scotland. The usurper was defeated and slain at Lumphanan, in Mar, in 1056, and Malcolm was acknowledged as king.

The long reign of Malcolm III. was the commencement of a great social and political revolution in Scotland. His residence in England, and still more his marriage with the English Princess Margaret, the sister of Edgar Atheling, led to the introduction of English customs, the English language, and an English population into the northern and western districts of the kingdom, which hitherto had been for the most part inhabited by a Celtic race. The influx of English colonists was increased by the tyranny of William the Conqueror and his Norman followers. All received a ready welcome from the Scottish king, whose object it was to assimilate the condition of the Scots in every respect to that of their fellow-subjects in Lothian; and what his stern, though generous, character might have failed to accomplish, was brought about by the winning gentleness and Christian graces of his English queen.

Malcolm fell in battle before Alnwick Castle in the year 1093, and Margaret survived only a few days. On this event, it seemed as if the work of their reign was about to be utterly overthrown. The Celtic people of Scotland, attached to their old customs, and disregarding the claims of Malcolm's children, raised his brother, Donald Bane, to the throne. The success, however, of this attempt to restore a barbarism which the better part of the nation had outgrown, was of brief duration; Donald was dethroned, and Edgar, the eldest surviving son of Malcolm and Margaret, was acknowledged as king. The very name of the new sovereign marked the ascendency of English influence. That influence, and all the beneficial effects with which it was attended, continued to increase during the reigns of Edgar and his brother and successor, Alexander I. The change went steadily on under the wise and beneficent rule of David (q. v.), the youngest son of Malcolm. His reign, which extended from 1124 to 1153, was devoted to the task of ameliorating the condition of his subjects, and never was such a work more nobly accomplished. David was in every respect the model of a Christian king. Pious, generous, and humane, he was at the same time active and just, conforming himself to the principles of religion and the rules of the church with all the devotion of his mother, but never forgetting that to him, not to the clergy, God had committed the government of his kingdom. He was all that Alfred was to England, and more than St Lewis was to France. Had he reigned over a more powerful nation, his name would have been one of the best known among those of the princes of Christendom. As it is, every Scottish scholar has delighted to do his character justice. At the time of David's accession, Scotland was still but partially civilised, and it depended in a great measure on the character of its ruler whether it was to advance or recede. It received a permanent stamp from the government of David. The Celtic people were improved morally, socially, and ecclesiastically, and all along the eastern coast were planted Norman, English, and Flemish colonies, which gradually penetrated into the inland districts, and established the language and manners of that Teutonic race which forms the population of the greater part of Scotland. David encouraged and secured the new institutions by introducing a system of written law, which gradually superseded the old Celtic traditionary usages, the first genuine collections of Scottish legislation belonging to his reign. David was as great a reformer in the church as in the state. The ecclesiastical system prevalent in Scotland almost up to his time differed in some points from that established in England and on the continent, bearing a great resemblance to that of Ireland, from which it was indeed derived. David established dioceses, encouraged the erection and endowment of parishes, provided for the maintenance of the clergy by means of tithes, and displacing the old Celtic monastic bodies, introduced the Benedictine and Augustinian orders.

David, though devoting his energies to the improvement of his subjects in the manner which has been mentioned, did not forget duties of a less agreeable kind. He knew that a Scottish king really held his crown by the tenure of the sword, and none of his fierce ancestors was a more intrepid warrior than the accomplished and saintly David. His skill and courage were shewn, though without success, at the Battle of the Standard. As the representative through his mother of the ancient kings of England, he had many friends in that

country; and had the Scottish army been successful, the history of the two kingdoms might in some respects have been different. As it was, he contented himself with maintaining the cause of his sister's child, the Empress Matilda, against King Stephen.

David's grandson and successor, Malcolm IV., reigned for twelve years, and the next king was William the Lion, Malcolm's brother, who ruled from 1165 to 1214. These princes pursued the policy of their grandfather with equal resolution, though sometimes with less success. They were embarrassed by their connection with the English King Henry II., who took advantage of his superior power and ability to impose unwise and unjust restraints on the independence of the Scottish sovereigns and their kingdom—a policy which laid the foundation of the unhappy national strife of after years. This was averted for a time by the concessions of Richard I. in 1189. 'For more than a century,' says Lord Hailes, 'there was no national quarrel, no national war between the two kingdoms—a blessed period.' That period was well employed by the next two kings, Alexander II. and Alexander III., the son and grandson of William the Lion, to consolidate the institutions of their kingdom, and extend and confirm what had been begun by David. Alexander III. was one of the ablest and best of the Scottish kings. By a treaty with the king of Norway, he added to his kingdom Man and the other islands of the Western Sea, held by the Norwegians. His sudden death, in 1286, was one of the greatest calamities with which Scotland could have been afflicted. It closed a period of prosperity—a course of improvement—which the kingdom did not again enjoy for nearly 500 years. The history of this interesting period has yet to be written. The only modern account of any value is that in the accurate but meagre Annals of Lord Hailes. Tytler begins his History with the reign of Alexander III.; and Robertson, in his narrative of two reigns—which in popular language is called the History of Scotland, just as Lord Macaulay's similar work is called the History of England—speaks of what took place during the whole time from the union with the Picts to the death of Alexander III., as 'events which may be slightly touched, but merit no particular or laborious inquiry.'

On the death of the infant grand-daughter and heiress of Alexander III., in 1290, the succession to the crown was disputed. The question between the two chief claimants, Baliol and Bruce (q. v.), was not free from doubt according to the customs of the time; and Edward I. of England, to whom the decision was referred, appears at first to have acted with good faith. But this great king, who had already subdued Wales, was now bent on uniting the British Islands under one sceptre; and in the pursuit of that object he sacrificed humanity, honour, and justice. The results were most deplorable. The national spirit of the Scots was finally roused, and after a long struggle under Wallace and Bruce they secured their independence on the field of Bannockburn (q.v.). The battle of freedom was won; but it was at the expense of tranquillity and civilisation. The border counties were continually wasted by the English; the central provinces were the scene of frequent warfare among the chief nobles; and the highland districts became more and more the seat of barbarism, the Celtic tribes reacquiring something of their old ascendency, just as they did in Ireland in the troubled times which followed the invasion of Edward Bruce. The strong arm of King Robert might have repressed these disorders, had his life been longer spared after the treaty of Northampton; but his death, and the accession of an infant son, again plunged the country into all the miseries of foreign and civil war. When that son, David II., grew up to manhood, he proved in every respect unworthy of his great father. His reign, and that of his successors Robert II. and Robert III., the two first princes of the House of Stewart, were the most wretched period of Scottish history. In the year 1411, half of the kingdom would have become absolutely barbarous, if the invasion of the Lord of the Isles had not been repulsed at Harlaw (q. v.), by the skill of the Earl of Mar, and the bravery of the lowland knights and burgesses.

A happier time began to dawn on the release of James I., in 1424, from his English captivity. The events of the following period are better known, and a brief notice of the most important will be sufficient. Reference may be made for details to the accounts of the particular kings. The vigorous rule of James I. had restored a tranquillity to which his kingdom had long been unaccustomed; but strife and discord were again brought back on his assassination. One of the most calamitous features of the time, was a succession of minorities in the sovereign. James himself had succeeded when a child and a captive; James II., James III., James IV., James V., Mary, and James VI., all succeeded while under age, and all, except James IV., when little more than infants. The courage and ability shewn by almost all the Stewart princes were insufficient to repair the mischiefs done by others in the beginning of their reigns, and to abate the great curse of the country the unlimited power and constant feuds of the nobles. The last addition to the Scottish kingdom was made in the reign of James III., when the islands of Orkney and Zetland were made over to him as the dowry of his queen, Margaret of Denmark. The marriage of James IV. with Margaret of England was far more important in its ultimate results, and brought about in the reign of his great-grandson that peaceful union with England which the death of the Maiden of Norway had prevented in the 13th century. Many good laws were enacted during the reigns of the Jameses; but the wisdom of the Scottish legislature was more shewn in framing them than the vigour of the government in enforcing them. Among the most important improvements of the period was the establishment of universities—the first of which, that of St Andrews, was founded during the minority of James I.—and the institution of the College of Justice in the reign of James V.

During the reign of the fifth James, religious discord added another element to the evils with which Scotland was afflicted. The practical corruptions of the church were greater than they were almost in any other country in Europe, and one of the consequences was, that the principles of the Reformation were pushed further than elsewhere. The first great ecclesiastical struggle had hardly ceased, by the overthrow of the Roman Catholic system, when the strife began anew in the Reformed Communion in the shape of a contest between Episcopacy and Presbyterianism, the former being supported by the sovereign, the latter by the common people, the nobles throwing their weight into either scale as it suited their policy at the time. James VI. struggled hard to establish an absolute supremacy, both in church and state, in opposition to a powerful party, which admitted no royal authority whatever in the former, and very little in the latter. After his accession to the English crown, he was apparently successful in carrying out his designs, but during the reign of his son, Charles I., the contest again broke out with increased bitterness. The nobility, whose rapacity

had been checked by the sovereign, joined the popular party. The opponents of the crown bound themselves together, first by the National Covenant, and afterwards in alliance with the English Puritans, by the Solemn League and Covenant. Their efforts were completely successful, but their success led to the utter overthrow of the monarchy by Cromwell.

The restoration of Charles II. was welcomed by all classes, wearied as they were of a foreign and military rule, but especially by the nobles and gentry, who had learned by bitter experience that the humiliation of the sovereign was necessarily followed by the degradation of their order. Had the government of Charles II. and James VII. been reasonably just and moderate, it could hardly have failed in securing general support; but unfortunately it was more oppressive and more corrupt than any which Scotland had experienced since the regencies in the minority of James VI. The natural result was the revolution, which seated William and Mary on the throne.

Hardly had the majority of the nation been successful in this, when many of them began to repent of what they had done, and Jacobitism became more popular than royalist principles had ever been when the House of Stewart was on the throne. The discontent was greatly increased by the fears entertained of English influence. The state of matters grew so threatening after the accession of Queen Anne, that the ruling English statesmen became satisfied that nothing short of an incorporating union between the two kingdoms could avert the danger of a disputed succession to the throne, and of a civil war. Supported by some of the ablest and most influential persons in Scotland, they were successful in carrying through their design, though it was opposed by a majority of the Scottish people. The Act of Union was formally ratified by the parliament of Scotland on the 16th of January 1707. It subsequently received the royal assent, and came into operation on the 1st of May of the same year. The union continued to be unpopular in Scotland for many years, an unpopularity increased by the corrupt means freely used to carry it through. But the discontent gradually ceased, and the ultimate consequences of the measure have been most beneficial to both kingdoms.

A few words may be added regarding the parliament of Scotland. That body was originally composed, like the English parliament, of three classes—the ecclesiastics (consisting of bishops, abbots, and priors), the barons, and the burgesses. The spiritual lords, during the establishment of Episcopacy after the Reformation, were composed of bishops only. When Presbyterianism was established at the time of the Covenant, and when it was formally ratified by law at the Revolution, the ecclesiastical estate ceased to have any place in parliament. The barons, or immediate vassals of the crown, at first sat in their own right, whether holding peerages or not; but afterwards the peers alone sat, the others sending their representatives. The burgesses were the representatives of the burghs. All the three estates sat to the very last in one house, the sovereign presiding in person, or through a commissioner named by him.

It would be impossible within reasonable limits to give a complete account of the original authorities for the history of Scotland. The principal ones are the following. For the period before the accession of David I.—Venerable Bede, the Early Lives of the Saints, the Irish Annals, the brief Scottish Chronicles published by Innes and Pinkerton, and the ancient English Chroniclers. For the subsequent period down to the Reformation—the Chronicles of Melrose and Lanercost, the Scotichronicon of Fordun and Bower, Winton's Chronicle, Leslie's and Buchanan's Histories, the English Chroniclers, the Ecclesiastical Chartularies, and the Acts of the Scottish Parliament. For the period from the Reformation to the Union—Knox's, Calderwood's, and Spottiswood's Histories, Baillie's Letters, Wodrow's and Burnet's Histories, the Acts of Parliament, and the State Papers. The chief modern authorities are Innes's *Critical Essay on the Ancient Inhabitants of Scotland*, Pinkerton's *Inquiry into the History of Scotland*, Chalmers's *Caledonia*, Hailes's *Annals*, and Tytler's, Robertson's, Laing's, and Burton's *Histories of Scotland*, and the *Domestic Annals of Scotland*, by R. Chambers.

SCOTLAND, Church of. An account has already been given of the conversion to Christianity of the early inhabitants of Scotland, see Columba, Culdees, Ninian, Picts, Scotland, *History*. The doctrines of the ancient Scottish Church were precisely the same as those of the rest of Western Christendom. In ritual there were some points of difference, but they were so slight, that the most important related to the time of observing the Easter festival. In these, also, the Scots gradually conformed to the usage of the Roman and English Churches. In one point, however, there continued for several centuries to be a marked distinction between the Scots and Irish on the one hand, and the churches of England and the continent on the other. This was in reference to ecclesiastical government. The Scots recognised the same orders of the ministry, bishops, priests, and deacons, as other Christians did; and, like them, they held that ordination could be given only by bishops. But they acknowledged no such supremacy of jurisdiction in the Episcopal order as was held by other churches. In Scotland, there were neither dioceses nor parishes; but there were numerous monasteries, in which the abbots, whether bishops or priests, bore the chief rule, all being in subordination to the successor of St Columba, the presbyter-abbot of Iona, who, in virtue of that office, was primate of the Picts and Scots.

When Iona was desolated by the Northmen, the primacy seems to have been transferred in the middle of the 9th c. to the Abbots of Dunkeld, and about fifty years afterwards to the Bishops of St Andrews, who became known as *Episcopi Scotorum*, the bishops of the Scots. Slowly at first, but gradually an assimilation to the English and continental practices began, a change rendered more easy by the Scottish dominion being extended over Lothian, in which the ecclesiastical system was the same as that of England. A great impulse was given in the same direction by the marriage of Malcolm III., king of the Scots, with Margaret the sister of Edgar Atheling. The king and queen used their utmost efforts to introduce the English usages in ecclesiastical as in other matters; and Margaret herself held repeated conferences for that purpose with the chief Scottish ecclesiastics, at which her husband acted as interpreter. The principal points in which she attempted to bring about a reform were the commencement of the Lent fast, the superstitious infrequency of receiving the communion, and the lax observance of Sunday and of the Scriptural and canonical restrictions on marriage between relations.

The reform begun by Malcolm and Margaret was fully carried out by their youngest son, David I. These improvements were completed by his successors, and before the end of the 12th c. the ecclesiastical system of S. differed in no important point

from that of the rest of Europe. Some Scottish writers have lamented the change, as being one from purity of belief and practice to superstition and immorality. This is undoubtedly a mistake. The Celtic Church had become very corrupt, and the clergy were inferior both in learning and morals to their brethren in the south. King David was a reformer in the best sense of the word, and it does not detract from the character of his reformation, that as time went on the Scottish Church became involved in those superstitions with which the rest of Christendom was overspread.

The ritual of the Scottish medieval church was almost the same as that of England, the Salisbury Missal and Breviary being the models of the Liturgies and Office Books used in Scotland. The external system of the church—cathedral, parochial, and monastic—was also in almost every point identical. The chief monastic orders were the Benedictine, and its most important branches the Cluniac and Cistercian, the canons regular of St Augustine, and the Reformed Premonstratensian canons. The Cluniacs and Cistercians were in strict subordination to the mother-houses of their orders at Cluny and Citeaux. In the 13th c. the Dominican, Franciscan, and Carmelite friars were introduced into Scotland. The chapters of all the Scottish cathedrals, except those of St Andrews and Whithorn, were composed of secular canons—the chief dignitaries being a dean, archdeacon, chancellor, precentor, and treasurer. The prior and canons regular of the Augustinian monastery at St Andrews formed the chapter of that see, and the prior and Premonstratensian canons of Whithorn formed the chapter of the cathedral of Galloway. There were twelve dioceses in the Scottish Church, to which Orkney was added on the transference of those islands to the Scottish sovereign in the 15th century. The twelve dioceses were Caithness, Ross, Moray, Aberdeen, Brechin, Dunkeld, Dunblane, St Andrews, Argyle, the Isles, Glasgow, and Galloway. The larger of these dioceses were divided, like the English dioceses, into rural deaneries. The single point in which the medieval church down to the 15th c. differed from that of England and other churches of the west, was in its having no metropolitan. St Andrews, and next to it Glasgow, had certain precedence; the bishops of the former see, and failing them the bishops of the latter, having the privilege of crowning and anointing the sovereign. But they had no jurisdiction over the other sees, nor did their bishops bear the style of archbishop. This led to claims on the part of the Archbishops of York to metropolitan authority in S., which had no foundation except in regard to the southern portion of the diocese of St Andrews, and the see of Galloway, the bishops of which were, for several centuries, suffragans of York. The court of Rome found it convenient, for the sake of its own privileges, to encourage this anomalous system; but to provide for the meetings of the Scottish bishops in provincial council, a bull of Pope Honorius III., in 1225, authorised them to meet in synod. In virtue of this bull, the bishops, abbots, priors, and other chief ecclesiastics, with representatives of the capitular, collegiate, and conventual bodies, assembled annually in provincial synod, sitting in one house, under the presidency of a conservator chosen by and from the bishops. The chief government of the church under the pope thus devolved on these synods, and their elective presidents. This continued until the erection of St Andrews into an archiepiscopal and metropolitan see, in virtue of a bull of Pope Sixtus IV., in 1472. By this bull all the Scottish sees were made suffragans to that of St Andrews, whose bishops were now to be styled archbishops.

In 1492 Glasgow was raised to the dignity of a metropolitan see by a bull of Pope Innocent VIII., and the Bishops of Dunkeld, Dunblane, Galloway, and Argyle were made suffragans to its archbishop, an arrangement which was soon afterwards altered to some extent—Dunkeld and Dunblane being reannexed to St Andrews, and Glasgow having for its suffragan sees those of Galloway, Argyle, and the Isles. This last arrangement continued till the Reformation; and afterwards, during the establishment of Episcopacy—the two Scottish archbishops occupying towards each other precisely the same position as the Archbishops of Canterbury and York, and being sometimes involved in the same unseemly broils, in regard to jurisdiction and precedence, which long existed between the English metropolitans.

S. shared in all the errors of belief and superstitious practices in worship to which the rest of Christendom was subjected, and the ignorance and immorality of the clergy were far worse than they were in England, or perhaps anywhere in Europe, except in the Scandinavian churches. The desire for reformation which led to the proceedings of Huss and Wickliffe, produced similar effects in the Scottish kingdom. As early as the year 1406 or 1407, James Resby, an English priest, and a disciple of Wickliffe, was burned at Perth; and in 1433, Paul Crawar, a German Hussite, was burned at St Andrews. The opinions of Wickliffe continued to be privately taught, particularly in the south-western counties, where his followers were known by the name of the Lollards of Kyle. In the following century, the intercourse with the continent was frequent and close, and the effects of Luther's preaching and writings were soon felt in Scotland. In the year 1525, the importation of Lutheran books, and the propagation of the Reformer's tenets, were forbidden by an act of the Scottish parliament; and in February 1528, Patrick Hamilton, abbot of Ferne, was burned at St Andrews for teaching and publishing Lutheran doctrines. The piety of Hamilton, and the patience with which he bore his sufferings, induced others to follow his teaching and example. Several persons, both ecclesiastics and laymen, were subsequently burned, and many more fled to England or the continent.

The persecution, though encouraged or permitted by the bishops, was disapproved of by some ecclesiastics of learning and influence, who were desirous of effecting a reform in the church without breaking off from communion with the hierarchy. The efforts of this school were unsuccessful, and the Scottish nation was gradually divided into two parties—one of which, headed by the bishops, and supported by the state, was determined to resist all change; and the other, composed of a considerable number of the clergy both regular and secular, of the gentry, and of the burgesses of the large towns, was disposed to carry its reforming principles far beyond what had been done by Luther and Melancthon. These two parties came into deadly conflict in 1546. On the 28th of February in that year, George Wishart, the most eloquent of the Reforming preachers, was condemned to death by an ecclesiastical court—at which Cardinal Beaton, Archbishop of St Andrews, presided—and was burned. On the 28th of May following, the cardinal was murdered by Norman Leslie and other adherents of the Reforming party. The struggle continued during the regency of the Earl of Arran and that of Mary of Lorraine, the mother of Mary, the young queen of Scots.

In the year 1559 the Reformers became strong enough to set the regent at defiance. Various

circumstances encouraged them to demand freedom for their opinions, particularly the death of Mary of England and the accession of Elizabeth. They were further animated at this time by the return from Geneva of their chief preacher, John Knox. The conflict was to be decided by other than spiritual weapons. The regent and the Reformed, now known by the name of the Congregation, met in open warfare. The contest was carried on for a twelvemonth, and ended in the triumph of the Congregation. A parliament met at Edinburgh on the 1st of August 1560. The Reforming party had the complete ascendency, and succeeded in passing several acts, by which the jurisdiction of the pope was abolished, the mass was proscribed, and a Confession of Faith, drawn up by Knox and his associates, was ratified, the spiritual lords making a faint resistance.

The new Confession of Faith adhered, in all essential articles of belief, to the ancient creeds of the church. In regard to the sacraments, it differed entirely from the recent corrupt teaching of the Western Church; but its language, on the whole, was moderate and conciliatory. In reference to ceremonies and the details of church polity, it declared that such things were temporary in their nature, and not appointed for all times and places, and that they ought to be altered when they fostered superstition and ceased to be conducive to edification.

A Book of Discipline was soon afterwards drawn up by the compilers of the Confession, which was generally approved of, but did not receive the sanction of parliament. It followed out in detail the principles laid down in the Confession. In regard to the office-bearers of the church various orders were mentioned, but three were specially of importance—ministers, elders, and deacons. Ministers were to be chosen by each several congregation, but were to be examined and admitted in public by the ministers and elders of the church. No other ceremony, such as imposition of hands, was to be used. The elders and deacons were to be chosen yearly in each congregation, and were not to receive any stipend, because their office was only to be from year to year, and because they were not to be debarred from attending to their own private occupations. In order to the better provision for the wants of the time, certain persons, called superintendents, were appointed in particular districts, with power to plant and erect churches, and to appoint ministers within the bounds of their jurisdiction.

The chief governing as well as legislative and judicial power in the Reformed Church was intrusted to a General Assembly, which met half-yearly or yearly, and was composed of the superintendents, ministers, and lay commissioners, and which gradually, by the introduction of the system of representation, assumed the form and more than the power of a parliament.

The worship of the Reformed Church was modelled on that established by Calvin at Geneva. It was embodied in a formulary called the Book of Common Order, which for nearly a century continued to be generally used. It contained forms for the ordinary worship both on Sundays and week-days, and for the administration of the sacraments, and for certain other occasions. The minister was not absolutely restricted to these forms. Except in the singing of Psalms, the people took no direct part in ordinary worship, and there was no distinction of ecclesiastical seasons, all holydays whatever except Sunday being abolished.

The form of church government established at the Reformation did not remain long undisturbed. Some of the most zealous Protestants thought the danger to which the church was exposed from state tyranny and aristocratical oppression, could best be met by restoring the bishops to their ancient position both in the church and in the parliament; while others, of equal zeal and sincerity, saw in this only the commencement of a plan for bringing back all the errors of popery. A scheme of this kind was actually established for some time, and the sees were filled with Protestant bishops set apart for the office by their brethren of the ministry. It was almost immediately attacked by some of the ministers, who soon found a leader in Andrew Melville, a scholar of considerable eminence, who returned to Scotland in 1574, after a residence in Geneva, during which he had ardently embraced the new opinions as to ecclesiastical government maintained by Beza.

The struggle continued for some years, the bishops being encouraged by the sovereign and his advisers, whose support was frequently of little real advantage to them, and Melville receiving the zealous assistance of many of the ministers, and of the great body of the common people, who sympathised with him in his democratical theories of civil and ecclesiastical government. Melville was at last entirely successful. His opinions were embodied in what was called the Second Book of Discipline, which received the formal sanction of the General Assembly in 1581. This formulary differed very much from the First Book. It laid down authoritatively those principles in regard to ecclesiastical authority which the English Puritans were vainly striving to establish in the southern kingdom, and was in reality an attempt to make the civil power subordinate to the ecclesiastical, even in matters secular. It recognised four orders of office-bearers in the church, the Pastor, Minister, or Bishop, the Doctor, the Presbyter or Elder, and the Deacon. These were to be set apart by ordination, and the imposition of the hands of the eldership, but no one was to be intruded into any office contrary to the will of the congregation, or without the voice of the eldership. Four sorts of church courts, each rising above the other, were sanctioned; first, of particular congregations one or more; second, of a province, or what was afterwards called the Provincial Synod; third, of a whole nation; and fourth, of the universal church. What is generally regarded as the most essential feature of the Presbyterian system—the Presbytery—was not yet introduced in its proper form, the lowest court being a combination of what were afterwards known as the Presbytery and the Kirk-Session. It was, however, introduced before the year 1592, when the privileges of general and provincial assemblies, presbyteries, and parochial sessions were ratified by parliament, though the Book of Discipline itself did not receive any formal sanction.

King James had agreed to the establishment of Presbyterianism, but personally, and as a sovereign, he disliked its discipline, and he soon endeavoured to overthrow it. His accession to the crown of England enabled him to do this with more authority. He gradually obtained from the General Assembly a recognition of the civil rights of the bishops, and this led to the restoration of their ecclesiastical privileges. His changes were sanctioned by a General Assembly which met at Glasgow in 1610, and in the course of the same year Episcopacy was restored in reality, as well as in name, by the consecration of three Scottish prelates, by four of the English bishops, at London.

The king wished to assimilate the Scottish Church, as far as possible, to that of England, and his next important movement was the establishment of what

are called the Five Articles of Perth. See PERTH, THE FIVE ARTICLES OF.

These various changes excited great dissatisfaction in Scotland, particularly in the southern counties, but it gradually abated to a considerable extent, and might have altogether ceased, had not further innovations been attempted. It was the wish of James to introduce a prayer-book like that of the English Church, in place of the Book of Common Order, but he saw the danger with which the proposal was attended, and gave it up or postponed it. His son Charles was as inferior to his father in prudence, as he excelled him in conscientiousness and religious zeal. During his first visit to Scotland he added another bishopric—that of Edinburgh—to the dioceses of the Scottish Church. Most unwisely, and most improperly, he endeavoured by his royal authority to introduce into that church a Book of Canons and a Liturgy framed on the model of those of England. The king had many loyal supporters in all parts of Scotland, and in the north Episcopacy was preferred by the people to Presbyterianism. But the storm of popular indignation which was now roused swept everything before it. The king's opponents banded themselves together by the National Covenant, and at a General Assembly held at Glasgow abolished the Perth Articles and Episcopacy, and re-established Presbyterianism. Charles attempted to maintain his claim by the sword, but was unsuccessful, and obliged to ratify in parliament all that had been done by his opponents.

Had the Covenanters been satisfied with the victory which they had won, Presbyterianism might have remained the established religion of the Scottish kingdom. But they could not resist the entreaties for aid from the English Puritans, or rather they yielded to the delusion of extending their own discipline over the churches of England and Ireland. They just attempted, in an opposite direction, what James and Charles had failed to accomplish. For a time their policy seemed to triumph. The Solemn League and Covenant of the three kingdoms, after having been approved by the General Assembly in Scotland, was signed by the Assembly of Divines which the parliament had summoned to meet at Westminster, and by the parliament itself. The ecclesiastical documents which were afterwards drawn up, originated with the Assembly of Divines, but were sanctioned by the Assembly in Scotland. The principal of these were a Directory for Public Worship, a Confession of Faith, and a Larger and Shorter Catechism. See ASSEMBLY OF DIVINES, and CREEDS AND CONFESSIONS. The first of these documents was intended to supersede the Book of Common Prayer in England, and, indirectly, the Book of Common Order in Scotland. It laid down certain general rules in regard to public worship and the administration of the sacraments, but left very much to the discretion of the particular ministers and congregations.

The union between the Scottish and English Puritans was dissolved by the ascendency of the Independents. Scotland, distracted by civil and ecclesiastical dissension, was unable to defend itself against Cromwell. It was conquered and kept thoroughly under subjection by the English army, which forbade the meetings of the General Assembly, but left the other courts and the rest of the church system as they were before. At the Restoration, the higher classes generally, who had suffered under the ecclesiastical tyranny of the ministers, were zealous for the re-establishment of Episcopacy. The greater part of the nation, except in the south-western provinces, was indifferent, and the king experienced no difficulty in restoring the bishops to their former rights both in church and state. But Episcopacy alone was restored; there was no attempt to introduce a liturgy, or even to enforce the observance of the Perth Articles. The new primate, Archbishop Sharp, was an able man, of good moral character, but ambitious and overbearing, and the Covenanters never forgave his change from Presbyterianism, though he had always belonged to the more moderate of the two parties into which the church was divided. He was almost the only one of the bishops who enjoyed political influence; and unfortunately for himself and the hierarchy, that influence was generally used to encourage, not to restrain, the severe measures of the government. When the primate was assassinated, that severity became a cruel tyranny, and many who had no predilection for any particular ecclesiastical opinions were ready to welcome the change which took place at the Revolution.

When the Scottish Estates met in 1689, to consider what course was to be adopted in the northern kingdom, the bishops declined to abandon King James. Whatever might have been the consequences had they taken an opposite course, this resolution was fatal to the Episcopal establishment. William and Mary were called to the throne, and Prelacy was declared to be an insupportable grievance, and was abolished. In the following year, Presbyterianism was re-established, and the Westminster Confession of Faith was ratified as the national standard of belief, and the right of patrons to nominate to ecclesiastical benefices was taken away. In the end of the same year a General Assembly was held, the first which had been allowed to meet since its dissolution by the order of Cromwell. It was composed, as before, of ministers and elders from the various presbyteries, and of elders from the burghs and universities, and was presided over by a lay commissioner, named by the crown, and a minister elected by the members as moderator. With the exception of some years in the reign of William, the Assembly has continued to meet annually since the Revolution, and to transact business during the periods when it was not in session by a commission named by itself for the purpose. See ASSEMBLY, GENERAL. The other chief ecclesiastical events of William's reign were a series of vain attempts on the part of the sovereign to bring about a comprehension of the Episcopal clergy with those of the Establishment, and the passing by the Assembly in 1697 of what was called the 'Barrier Act' (q. v.), which guarded against sudden legislation, by providing that no permanent act should be passed until it had received the approbation of the majority of the presbyteries.

During the reign of Queen Anne, and in the year 1707, England and Scotland were united into one kingdom. A special statute was passed for the security of the Protestant religion and Presbyterian church government in the latter country; providing that these should continue without any alteration in time to come, and confirming the act of William and Mary, which ratified the Confession of Faith, and settled the Presbyterian form of church government.

In the year 1712, an act was passed by the British parliament which restored to patrons in Scotland their right of presentation to benefices. This statute excited great discontent among the members of the Established Church, and for many years attempts were made to obtain a repeal of it. These attempts were unsuccessful, but its provisions were long practically disregarded. When at length the General Assembly began to act upon it, the dissatisfaction increased among those who

held the divine right of the people to choose their own ministers. The leader of the discontented party was a minister named Ebenezer Erskine, and he with his adherents, in the year 1733, finally separated from the Establishment, and formed a communion which took the title of the Associate Presbytery, though its members were popularly known as the Seceders. The Seceders themselves were soon divided by a very absurd dispute into two bodies, called the Burgher and Antiburgher Synods. In the year 1761, another secession from the Establishment took place in connection with the law of patronage; and the separated body assumed the name of the Presbytery of Relief.

There were no further secessions from the church; but its members were divided into two parties, known as the Moderates and the Evangelicals (q. v.), the former of whom were favourable, the latter hostile to the law of patronage. For many years the Moderates, headed by Dr Robertson the historian and others of his school, and supported by the influence of the government, maintained an ascendency in the General Assembly and throughout the country. In the latter years of George III., and during the reign of George IV., this ascendency began to decrease. The political excitement which prevailed in the beginning of the reign of William IV. strongly affected the Scottish Establishment, which from its very constitution is peculiarly liable to be moved by the impulses of popular feeling. The two parties in the General Assembly engaged in a struggle more fierce than any in which they had yet met; and the subject of dispute, as before, was immediately connected with the law of patronage. Dr Chalmers, the most distinguished minister in Scotland, added the whole weight of his influence to the popular party, and in 1834 an interim act of Assembly was passed, known as the Veto Act, which declared it to be a fundamental law of the church that no pastor should be intruded on any congregation contrary to the will of the people, and laid down certain rules for carrying out this principle. The legality of this act was doubted; and in connection with a presentation to the parish of Auchterarder, the presentee, on being rejected by the presbytery in terms of the Veto Act, appealed, with concurrence of the patron, to the Court of Session—the supreme civil court in Scotland. That court decided that the conduct of the presbytery in rejecting the presentee was illegal, and their judgment was affirmed by the House of Lords. Other cases of a similar nature followed, and something like a conflict took place between the civil and ecclesiastical courts, the former enforcing their sentences by civil penalties, the latter suspending and deposing the ministers who obeyed the injunctions of the Court of Session. In the General Assembly of 1843 the dispute came to a crisis. A large number of ministers and elders of the popular party left the Assembly, and met apart in a similar body, of which Dr Chalmers was chosen moderator. They formed themselves into a separate communion under the title of 'The Free Church of Scotland,' and gave up their benefices in the Established Church, and all connection whatever with that body. The Free Church carried off about one-half of the members of the Establishment, and became a rival communion in most of the parishes of Scotland. See FREE CHURCH.

Before the commencement of this great struggle, and again soon after its conclusion, the divisions connected with the older separation were partially healed. In 1820 the Burgher and Antiburgher Seceders were united under the name of the Associate Synod of the Secession Church; and in 1847 this Associate Synod and the Relief Synod were united under the name of 'The United Presbyterian Church' (q. v.). Negotiations are at present in progress for an union of the United Presbyterian Church and the Free Church.

A few remarks may be added on the history of Scottish Episcopacy subsequently to the Revolution. It is a common but erroneous opinion that almost all the Episcopal clergy were Jacobites from the time of the accession of William and Mary. The bishops were so; but a large number, probably a considerable majority of the clergy, had at first no objection to take the oath of allegiance to the new government. During the reign of Queen Anne, the Episcopal clergy were well disposed to the government, knowing the queen's good wishes to their communion. They were frequently harassed by the courts of the Establishment; but all who were willing to take the oaths obtained an ample protection for their worship on the passing of the Toleration Act of 1712. On the death of the queen, almost all the clergy, and most of the laity, were involved directly or indirectly in the attempts to overthrow the Hanoverian dynasty, and it was this which finally made the names of Episcopalian and Jacobite for many years to be convertible terms.

In the meantime, the succession of bishops had been kept up by new consecrations, and after some years the dioceses, though diminished in number, were regularly filled. An important change took place in the forms of worship. No longer trammelled by their connection with the state, they adopted liturgical forms similar to those in the English Prayer-book, and in almost all cases identical, except that many of the congregations used an Office for the communion modelled on that of the Scottish Liturgy of King Charles I. The Episcopalians took no such open part in the insurrection of 1745 as they did in that of 1715, but their sympathies were known to be with the House of Stewart; and the government carried through parliament some intolerant acts, which were put in execution with great harshness, and which for many years suppressed all public worship in the Episcopal communion. It was only after the accession of George III. that these statutes ceased to be actively enforced; and it was not till 1792 that the Episcopalians, who from the death of Prince Charles had acknowledged the reigning dynasty, were relieved from the penal laws. The act which gave this relief imposed restrictions on their clergy officiating in England, and prohibited their holding benefices in the English Church. In 1804, the bishops and clergy agreed to adopt the Thirty-nine Articles of the Church of England, and in 1863, the Prayer-book was adopted as the authorised service-book of the Episcopal Church, permission being given in certain cases to use the Scottish Communion Office. The restrictions imposed on the Scottish clergy by the act of 1792 were modified by an act passed in 1840; and in 1864 they were entirely removed, the right being reserved to bishops in England and Ireland to refuse institution to a Scottish clergyman without assigning any reason, on his first presentation to a benefice in England or Ireland, but not after he should have once held such benefice.

The dioceses of the Scottish Episcopal Church are seven in number, viz., Moray, Aberdeen, Brechin, Argyle, St Andrews, Edinburgh, and Glasgow. The bishops are chosen by the clergy of the diocese, and by representatives of the lay communicants, a majority of both orders being necessary to a valid election. One of the bishops, under the name of Primus, chosen by the other bishops, presides at all meetings of the bishops, and has certain other privileges, but possesses no metropolitan authority.

The highest judicial body is the Episcopal College, composed of all the bishops. The highest legislative body is a General Synod, composed of two houses, the one of the bishops, the other of the deans and the representatives of the clergy.

The chief original authorities for the ecclesiastical history of Scotland down to the Revolution are the same as those mentioned in the article on the Civil History (q. v.). The chief modern authorities are: Cook's *History of the Reformation* and *History of the Church of Scotland;* Cunningham's *Church History of Scotland;* Grub's *Ecclesiastical History of Scotland.*

SCOTLAND, ROYAL ARMS OF. The arms of Scotland are—Or, a lion rampant gules, armed and langued azure, within a double tressure flory counterflory of fleurs-de-lis of the second. Supporters—Two unicorns argent armed maned and unguled or, gorged with open crowns, with chains affixed thereto, and reflexed over the back of the last. Crest—A lion sejant affronté gules crowned or, holding in the dexter paw a sword, and in the sinister a sceptre, both erect proper.



Royal Arms of Scotland, previous to the Union.

The lion is first seen on the seal of Alexander II., and the tressure on that of Alexander III. The unicorn supporters do not appear on any of the royal seals of Scotland till the time of Queen Mary, on whose first Great Seal (1550) they are represented as chained and gorged with crowns. They were, however, sculptured on Melrose Abbey as early as 1505.

In 1603, in consequence of the union of the crowns of England and Scotland, the Scottish arms came to be quartered with those of England and Ireland, while one of the English lions was adopted as a supporter. Precedence was, however, given within Scotland to the Scottish ensigns, which occupied the first and fourth quarters, and the unicorn also obtained the place of honour, being dexter supporter. From about the time of Charles I. to 1707, it became the practice to represent the unicorn as not merely gorged with an open crown, but crowned with an imperial crown. The Treaty of Union of 1707 declared (Art. 1) that the ensigns of the United Kingdom should be in future such as her majesty should appoint 'on all flags, banners, standards, and ensigns, both on sea and land;' the same mode of marshalling being adopted in England and Scotland. But Art. 24 has been sometimes supposed to leave room for a different mode of marshalling on the seals in use in matters relating exclusively to Scotland, and on the Great and other seals of Scotland. Since, as well as before the Union, precedence has been given to Scotland. The question of the proper marshalling of the royal arms within Scotland was raised in 1853 by a petition to the Queen by the magistrates of Brechin; a reference was made by the Home Office in the first instance to Garter King-at-Arms, and Garter's report was transmitted to the office of the Lord Lyon, where it was returned with observations by the Lyon Depute, who considered Scotland entitled to precedence on the judicial seals of the country; and his views have since continued to be acted on.

SCOTT, DAVID, a remarkable Scottish painter, was born in Edinburgh, October 10, or 12, 1806. He may be said to have commenced his career as an artist by an apprenticeship to his father, who was a landscape engraver; but endowed as he was with a deep, stern, sombre genius, it was soon visible to all who knew him that he was meant to be a painter. The first production that he ventured to send to the British Institution, 'Lot and his Daughters fleeing from the Cities of the Plain,' was returned as too large; but S. was too 'imperiously original' to take advice, and went on courageously painting pictures which, it has been said, 'would have required a hall for their exhibition, and which the public would neither admire nor buy.' In 1831, he exhibited the 'Monograms of Man,' a series of singularly suggestive sketches; and the first of his illustrations to Coleridge's *Ancient Mariner*, which are almost equal to the poem itself in wierd and vivid beauty. In 1832, among others, 'Sarpedon carried by Sleep and Death,' a very fine work. In the autumn of the same year he set out for Rome, visiting most of the famous artistic cities on his way. Nothing, however, that he saw in Italy or France, materially affected the bent of his genius, and his picture of 'Discord, or the Household Gods Destroyed,' painted there, exhibits all the peculiarities of his style and thought in a rampant and even repellent manner. In 1834 he returned to Edinburgh, and resumed his solitary brush. Passing over several interesting works, we may specially mention, as belonging to the year 1838, 'Ariel and Caliban,' and the 'Alchymist,' two of his best efforts in point of execution. Between 1840 and 1843, his chief productions were 'Philoctetes,' 'Queen Elizabeth in the Globe Theatre,' 'The Duke of Gloucester taken into the Water-gate of Calais,' 'Silenus praising Wine,' 'Richard III.;' his illustrations (40 in number) of *The Pilgrim's Progress*, in which, as in those of *The Ancient Mariner*, he rivals the genius of the author he illustrates. In 1847, he produced the masterpiece of his whole career, 'Vasco de Gama encountering the Spirit of the Cape.' But S., always delicate, and even drooping in health, had now exhausted himself, and on the 5th of March 1849 he died, when fame was only beginning to encircle his name. S.

contributed some vigorous essays on 'The Characteristics of the Great Masters' to *Blackwood's Magazine*. An unusually interesting *Memoir* by his brother, W. B. Scott, was published in 1850.

SCOTT, Sir Michael, a medieval scholar and philosopher of the 13th c., whose real history is not only obscure but positively unknown. Boece identifies him with a Michael Scott of Balweary, in the parish of Kirkcaldy, in Fifeshire, who, along with Sir Michael de Wemyss, was sent to Norway in 1290, by the Scottish Estates, to bring home the 'Maiden of Norway,' and his death is fixed in the following year. But Sir Robert Sibbald, in his *History of Fife and Kinross* (published in the reign of Charles II.), speaks of a certain indenture, dated 1294, to which S.'s name was affixed, and in another part of the same book states that he went on a second embassy to Norway, in 1310, to demand the cession of the Orkneys. If we may rely upon Sir Robert's statement, it is hardly possible that the Scotch 'wizard' of European renown could have been the same person as Michael Scott of Balweary, because (as the story goes) after studying at Oxford or Paris, he went to the court of Frederic II., and wrote there some books at the request of that monarch. Now Frederic died in 1250, and supposing 'the wizard' not more than 30 years old at that time, this would make him 70 when he went to Norway the first time to bring home the 'Maiden,' and 90 on his second visit to demand the cession of the Orkneys; neither of which things is likely. Hector Boece, it should be observed, is our sole authority for the identification of Michael Scott of Balweary with the wizard, while, on the other hand, Dempster, in his *Historia Ecclesiastica Gentis Scotorum* (Bologna, 1627), distinctly avers that the name *Scotus*, borne by the latter, was that of his nation and not of his family—Michael, 'the Scot.' It has been suggested that the ambassador may have been the son of the wizard, and that Boece may have confounded the two—a supposition probable enough in itself, but for which, in the absence of evidence, nothing can be said. The legend is further complicated by the fact that it appears to be English as well as Scottish. Cumberland claims the magic hero for herself. Camden, in his *Britannia* (1586), asserts that he was a monk of Ulme or Holme Cultram in that country, about 1290, 'who applied himself so closely to the mathematics, and other abstract parts of learning, that he was generally looked on as a conjuror; and a vain credulous humour has handed down I know not what miracles done by him.' He likewise states that S.'s 'magic books' were preserved there, but adds that they were then mouldering into dust; and Satchells (see his rhyming *History of the Right Honourable Name of Scott*) declares that he examined a huge tome which was held to be the wizard's, at Burgh-under Bowness in 1629. According to the Scottish legend, he was buried in the Abbey of Melrose, and the Border was the scene of many of his most wonderful exploits, such as the cleaving of the Eildon Hills into three separate cones, and his bridling of the river Tweed! Dante mentions him in his *Inferno* (some years before 1321), in a way that shews that already his fame as a magician had spread over the continent, and suggests the suspicion that he must have died sooner than is commonly believed. All, however, that any one who rationally looks at the legend can believe is, that a certain Michael Scott, or Michael the Scot, flourished in the 13th c., and was mistaken by the common people of his country for a wizard or magician, probably on account of his skill as an experimentalist in natural philosophy. The writings attributed to him indicate that his studies lay in this direction.

SCOTT, Sir Walter, the fourth child of Walter Scott, Writer to the Signet in Edinburgh, was born in that city on the 15th August 1771. He came of the old Border family, the Scotts of Harden, an offshoot from the house of Buccleuch. Though he matured into a man of robust health, and of strength nearly herculean, as a child he was feeble and sickly, and very early he was smitten with a lameness which remained with him through life. His childhood was passed for the most part at Sandyknowe, the farm of his grandfather, in Roxburghshire. Here the foundations of his mind were laid; and his early and delighted familiarity with the ballads and legends then floating over all that part of the country, probably did more than any other influence to determine the sphere and modes of his future literary activity. Between the years 1779 and 1783 he attended the High School of Edinburgh, where, despite occasional flashes of talent, he shone considerably more on the playground as a bold, high-spirited, and indomitable little fellow, with an odd turn for story-telling, than within he did as a student. In 1783, he went to the University, and for three years he remained there, as it seemed, not greatly to his advantage. Afterwards, in the height of his fame, he was wont to speak with deep regret of his neglect of his early opportunities. But though leaving college but scantly furnished with the knowledge formally taught there, in a desultory way of his own he had been hiving up stores of valuable, though unassorted information. From his earliest childhood onward, he was a ravenous and insatiable reader; his memory was of extraordinary range and tenacity, and of what he either read or observed he seems to have forgot almost nothing. Of Latin, he knew little, of Greek less; but a serviceable, if somewhat inexact knowledge of French, Italian, Spanish, and German he had acquired, and he continued to retain. On the whole, for his special purposes, his education was perhaps as available as if he had been the pride of all his preceptors. In 1786, he was articled apprentice to his father, in whose office he worked as a clerk till 1792, in which year he was called to the bar. In his profession he had fair success, and in 1797 he was married to Charlotte Margaret Carpenter, a lady of French birth and parentage. Towards the end of 1799, through the interest of his friends Lord Melville and the Duke of Buccleuch, he was made sheriff-depute of Selkirkshire, an appointment which brought him £300 a year, with not very much to do for it. Meantime, in a tentative and intermittent way, his leisure had been occupied with literature, which more and more distinctly announced itself as the main business of his life. His first publication, a translation of Burger's ballads, *Lenore* and *The Wild Huntsman*, was issued in 1796. In 1798 appeared his translation of Goethe's drama of *Goetz von Berlichingen*; and in the year following he wrote the fine ballads, *Glenfinlas*, the *Eve of St John*, and the *Grey Brother*. The year 1802 gave to the world the first two volumes of his *Border Minstrelsy*, which were followed in 1803 by a third and final one. This work, the fruit of those 'raids'—as he called them—over the Border counties, in which he had been wont to spend his vacations, was most favourably received by the public, and at once won for him a prominent place among the literary men of the time. In 1804, he issued an edition of the old poem *Sir Tristrem*, admirably edited and elucidated by valuable dissertations. Meantime *The Lay of the Last Minstrel* had been in progress, and by its publication in 1805, S. became at a bound the most popular author of his day. During the next ten years, besides a mass of miscellaneous work, the

most important items of which were elaborate editions of Dryden (1808) and of Swift (1814), including in either case a Life, he gave to the world the poems *Marmion* (1808), *The Lady of the Lake* (1810), *The Vision of Don Roderick* (1811), *Rokeby* (1812), *The Bridal of Triermain*, anonymously published (1813), *The Lord of the Isles*, and *The Field of Waterloo.* The enthusiasm with which the earlier of these works were received somewhat began to abate as the series proceeded. The charm of novelty was no longer felt; moreover, a distinct deterioration in quality is not in the later poems to be denied; and in the bold outburst of Byron, with his deeper vein of sentiment and concentrated energy of passion, a formidable rival had appeared. All this S. distinctly noted, and after what he felt as the comparative failure of *The Lord of the Isles* in 1815, with the trivial exception of the anonymous piece *Harold the Dauntless* (1817), he published no more poetry. But already in *Waverley*, which appeared without his name in 1814, he had achieved the first of a new and more splendid series of triumphs. *Guy Mannering*, *The Antiquary*, *The Black Dwarf*, *Old Mortality*, *Rob Roy*, and *The Heart of Midlothian* rapidly followed, and the 'Great Unknown,' as he was called (whom yet every one could very well guess to be no other than Walter S.), became the idol of the hour. The rest of the famous series, known as the Waverley Novels, it would be idle to mention in detail. From this time onward, for some years, S. stood on such a pinnacle of fame and brilliant social prosperity as no other British man of letters has ever gone near to reach. He resided chiefly at Abbotsford, the 'romance in stone' he had built himself in the Border country which he loved, and thither, as 'Pilgrims of his Genius,' summer after summer repaired crowds of the noble and the distinguished, to partake the princely hospitalities of a man whom they found as delightful in the easy intercourse of his home, as before they had found him in his writings. In 1820, to set a seal upon all this distinction, a baronetcy was bestowed upon him as a special mark of the royal favour. But the stately fabric of his fortunes, secure as it seemed, was in secret built upon the shifting sands of commercial speculation, and in the disastrous crisis of the year 1826 a huge ruin se[illegible] In 1805, S.'s income, as calculated by his biographer, was something nigh £1000 a year, irrespective of what literature might bring him; a handsome competency, shortly by his appointment to a clerkship of the Court of Session, to have an increment at first of £800, subsequently of £1300 But what was ample for all prosaic needs, seemed poor to his imagination with its fond and glittering dreams. Already some such vision, as at Abbotsford was afterwards realised, flitted before his mind's eye, and it was the darling ambition of his heart to re-create and leave behind him, in the founding of a family, some image of the olden glories which were the life of his literary inspirations. In the year above mentioned, lured by the prospect of profit, and without the knowledge of his friends, he joined James Ballantyne, an old schoolfellow, in the establishment of a large printing business in Edinburgh. To this, a few years afterwards, a publishing business was added, under the nominal conduct of John Ballantyne, a brother of James; S., in the new adventure, becoming as before a partner. Gradually the affairs of the two firms became complicated with those of the great house of Constable & Co., in the sudden collapse of which S. found himself one forenoon a bankrupt, with personal liabilities to the extent of something like £150,000.

'In the reproof of chance
Lies the true proof of men'—

and now, in this challenge of adverse fate, S.'s manhood and proud integrity were most nobly approved. With his creditors, composition would have been easy; but this usual course he disdained. 'God granting him time and health,' he said, he would owe no man a penny. And somewhat declined as he now was from the first vigour and elasticity of his strength, he set himself by the labour of his pen to liquidate this enormous debt.

Breaking up his establishment at Abbotsford, where the wife whom he loved lay dying, he hired a lodging in Edinburgh, and there for some years, with stern and unfaltering resolution, he toiled at his prodigious task. The stream of novels flowed as formerly; a *History of Napoleon*, in eight volumes, was undertaken and completed, with much other miscellaneous work; and within the space of two years, S. had realised for his creditors the amazing sum of nearly £40,000. A new and annotated edition of the novels was issued with immense success, and there seemed every prospect that, within a reasonable period, S. might again front the world, as he had pledged himself to do, not owing to any man a penny. In this hope he toiled on; but the limits of endurance had been reached, and the springs of the outworn brain broke in that stress of cruel and long-continued effort. In 1830 he was smitten down with paralysis, from which he never thoroughly rallied. It was hoped that the climate of Italy might benefit him; and by the government of the day a frigate was placed at his disposal in which to proceed thither. But in Italy he pined for the home to which he returned only to die. At Abbotsford, on the 21st September 1832, he died with his children round him and the murmur of the Tweed in his ears. On the 26th, he was buried beside his wife in the old Abbey of Dryburgh.

In estimate of S. as an author, a few words must suffice. As regards his poetry, there is now little difference of opinion. Its merits, if somewhat superficial, are very genuine, and continue to secure for it some portion of the popular favour with which it was at first received. Deficient in certain of the higher and deeper qualities, and in those refinements of finish which we are of late accustomed to exact, it is admirable in its frank *abandon*, in its boldness and breadth of effect, its succession of clear pictures, its careless, rapid, easy narrative, unfailing life, spirit, vigorous and fiery movement. As a lyrist, S. specially excelled; and scattered hither and thither in his works are to be found little snatches of ballad and song scarcely surpassed in the language. The rank of S. as a writer of prose fiction, it is not so easy to fix with anything like precision. So imposing to the mind is his immense *prestige* as a novelist, that even at this date it is difficult to *criticise* him coolly; but it is not without risk of awakening some under-murmur of dissent, that the absolute supremacy can now be assigned him which at one time, almost without question, used to be conceded as his due. Nor is the dissent without some just ground of reason. S., with the artistic instinct granted him in largest measure, had little of the artistic conscience. Writing with the haste of the *improvisatore*, he could exercise over his work, as it proceeded, no jealous rigour of supervision; and on its appearance he was amply pleased with it if the public paid him handsomely. Hence he is an exceedingly irregular writer; many of his works are in structure most lax and careless, and some of the very greatest of them are disgraced by occasional infusions of obviously inferior matter. Yet, all reasonable deductions made, it may be doubtful whether in mass and stature he is quite reached by any other novelist who could be mentioned. To class him, or even speak of him along

with Shakspeare, is absurd; but it is scarcely absurd perhaps to say that, *since* Shakspeare, to no British man has such wealth in this kind been intrusted. If, as we believe, the final test of greatness in this field be the power to vitalise character, to enrich our experience by imaginative contact with beings ever after more intimately distinct and real for us than the men we daily shake hands with, very few writers can be held to surpass Scott. Further, he invented the historical novel, and in doing so, created a distinct literature, brought life into our conceptions of the past, and revolutionised our methods of writing history itself by a vivid infusion into them of picturesque and imaginative elements. On his *Scotch* novels his fame most securely rests; the others, for the most part, being obviously at times even painfully inferior. S.'s was essentially a great, shrewd, sagacious, *practical* intelligence; on the speculative side he was not so properly weak as entirely defective.

SCOTT, WINFIELD, American general, was born at Petersburg, Virginia, of Scottish ancestry, January 13, 1786, was educated at William and Mary College, and studied the profession of law; but in 1808, having a genius for military pursuits, he was appointed captain of light artillery in General Wilkinson's division, stationed at Baton Rouge Louisiana, but was suspended for having accused his general of complicity with the conspiracy of Aaron Burr. At the commencement of the war of 1812, he was appointed lieutenant-colonel, and sent to the Canadian frontier. He crossed with his regiment at Queenston Heights, where the American troops were at first successful; but on the British receiving reinforcements, they were repulsed with heavy loss, and S. was taken prisoner. The following year, having been exchanged, he was appointed adjutant-general, and was wounded by the explosion which followed the assault on Fort George. In 1814, as brigadier-general, he established a camp of instruction, and from April to July drilled his raw levies in the French tactics with such effect, that on the 3d of July he took Fort Erie, opposite Buffalo, by assault; and on the 5th fought a sharp drawn battle at Chippewa, and twenty days after, the famous frontier battle of Lundy's Lane, in which he had two horses killed under him, and was twice wounded, the last time severely. He was raised to the rank of major-general, and compiled the General Regulations of the Army, and translated and adapted from the French the system of Infantry Tactics, which has since been the text-book of the American army. In the Indian hostilities of the American frontier, in the excitement attending the threat of Nullification in South Carolina, and in the Seminole war, General S. manifested those qualities of wisdom and moderation which made him rather a pacificator than a warrior. During the Canadian revolt of 1837--1838, he displayed great tact in allaying the excited passions of the frontier. In 1841 he was appointed commander-in-chief of the U.S. army, and in 1846 directed the military operations in the war against Mexico. Taking the field in person, he, March 9, 1847, landed 12,000 men at Vera Cruz, and invested and bombarded the city, which capitulated on the 26th. April 18th he carried the heights of Cerro Gordo, on the 19th he took Jalapa, on the 22d Perote, and on May 15th Puebla, where, owing to his heavy losses, chiefly by diseases incident to the climate, he was obliged to wait for reinforcements. On the 10th of August he advanced, with 10,780 men, to encounter the larger forces and strong positions of General Santa Anna. He turned El Penon, and won the brilliant victories of Contreras and Churubusco. Santa Anna entered upon negotiations only to gain time and strengthen his defences. These were followed by the sharp and sanguinary battles of Molino El Rey and Churubusco, September 8th, strong positions skilfully and bravely defended by superior numbers; and on the 14th S. entered the city of Mexico at the head of less than 8000 soldiers. Peace was negotiated with the cession of New Mexico and California to the United States, and the victorious general was welcomed home with the liveliest demonstrations. In 1852 General S. was the candidate of the Whig party for the presidency, but was defeated by one of his subordinate officers, General Franklin Pierce. In 1855, was created for him the office of lieutenant-general. At the beginning of the war of Secession in 1861, he foresaw more than many others its extent and serious character, and advised the calling out a much larger force than was first brought into the field. He had even suggested the advisability of allowing the 'wayward sisters to part in peace.' Age and growing infirmities compelled him in November 1861 to retire from active command. He subsequently visited Europe and published his *Memoirs* (8vo, 2 vols., New York, 1864). S. died May 29, 1866.

SCOTTISH LANGUAGE AND LITERATURE. The remarks which follow are merely supplementary to the articles on ANGLO-SAXON LANGUAGE AND LITERATURE, ENGLISH LANGUAGE, and ENGLISH LITERATURE (q. v.). Reference is made in the second of these articles to the different opinions which have prevailed regarding the origin of the dialects of the north-eastern provinces of Scotland. There can hardly be a doubt that the true explanation is that which is preferred by the writer of the article—that the language of those districts, like that of the south-eastern provinces of the Scottish kingdom, was 'as decidedly Anglo-Saxon in its form and substance as that of Norfolk or Yorkshire.' This is also the opinion of Mr Latham, as expressed in the brief chapter of his work on the English Language, in which he treats of 'the Lowland Scotch.' He adds, in reference to the claims of the latter to be considered a separate language, that the Lowland Scotch means 'the *literary* Lowland Scotch which, under the first five Stewarts, was as truly an independent language as compared with the English, as Swedish is to Danish, Portuguese to Spanish, or *vice versa*.' This is expressed with substantial justice, though it would have been more accurate to speak of the Scotch as an independent tongue from the reign of the first prince of the House of Stewart to the accession of James VI. to the English crown.

The history of Scottish literature may be divided into two periods; the first extending from the date of the earliest composition in the language of Northern Britain to the union of England and Scotland under one king, the second from that time to the present day.

During the earlier period Scotland was an independent kingdom, politically separate from England, and, as a general rule, bitterly opposed to English influence—forming in that respect a contrast to what it was before the decease of Alexander III. A well-known brief lament for the death of that king preserved by Winton, and marked by considerable beauty and pathos, is generally supposed to be one of the earliest specimens of Scottish poetry which has come down to us. The first Scottish *poet*—in the proper sense of the word—was John Barbour, archdeacon of Aberdeen, who was born in the first half of the 14th c., and died in 1395. His great work—the only one which has been preserved—is his poem of *The Bruce*, in which he celebrates the struggles and final victory of the Scottish king, Robert I. The poem is not unworthy of such a hero, and is superior to any composition by English

writers of the same century, with the exception of Chaucer. It has frequently been remarked that the language of Barbour is as intelligible to a reader of the present time as that of the father of English poetry. There are editions of *The Bruce* by Pinkerton and Jamieson, but the latest and best is that by Mr Cosmo Innes.

The 15th c., during which England produced no poetical writer of eminence, was fertile in Scottish poets. First in rank, and hardly inferior to any in genius, was James I., king of Scotland, the author of *The King's Quair.* Before him, in point of time, was Andrew Winton, prior of Lochleven, who wrote a metrical chronicle which was edited—so far as it treated of Scottish history—by David Macpherson in 1795. The historical value of this work is great; its literary merits are sufficiently humble. Another Scottish poet of this age was Henry the Minstrel, commonly called Blind Harry, the author of a poem on the life of Sir William Wallace, which in a modernised text was long a favourite book among the middle and lower classes of Scotland.

The closing years of this century, and the first half of the next, were distinguished by poets of still higher name. Foremost of these is William Dunbar (q. v.), author of *The Thistle and the Rose, The Golden Terge*, and many smaller poems, both serious and satirical, of very high merit. The only complete edition of his works is that by Mr David Laing, which was published in 1834. Gavin Douglas (q. v.), a son of the Earl of Angus, and Bishop of Dunkeld, was contemporary with Dunbar. He wrote several original poems, but his principal work is the translation in which he first gave 'rude Scotland Virgil's page.' The last remarkable writer of this age is Sir David Lindsay (q. v.), who died about 1557, and whose poetical works were published in 1806 by George Chalmers. The 16th c. also produced the first Scottish prose-writers. Among these is the anonymous author of *The Complaint of Scotland*, and John Bellenden, Archdeacon of Moray, the translator of Boece's *History of Scotland*, and of the first five books of Livy.

With Lindsay ceased that succession of poets which had continued without interruption from the time of Barbour. It was more than a century and a half before another poetical writer of note made his appearance. The ecclesiastical troubles of the period were not favourable to the cultivation of literature. Most of the scholars of that time wrote in Latin; but for one prose-work of great merit as a composition, *The History of the Scottish Reformation*, we are indebted to the leader of the movement, John Knox (q. v.).

We have now reached the close of the first period. The accession of King James to the crown of England was unpropitious to the literature of Scotland. The parliament still met at Edinburgh, but the capital had ceased to be the residence of a court, and the language began to degenerate, and to be looked upon as a vulgar dialect of the English, rather than as the speech of an independent nation. The dreariest period of Scottish literary history is that between the union of the sovereigns under James, and of the kingdoms in the reign of Queen Anne. Writings in verse, called poems, continued to be published, and several of the prose-writers, such as Spalding, the Aberdeen annalist, wrote sometimes with a taste for the picturesque; but the best authors composed in English. It was in that language Drummond (q. v.) of Hawthornden wrote his verses, Archbishop Spottiswood (q. v.) and Bishop Burnet their histories, and Archbishop Leighton (q. v.) and Henry Scougal their theological works, so far as they were not in Latin.

It might have been expected that the union of the kingdoms, by which Scotland was deprived of a legislature of her own, and of the shadow of royal state, which to that time had continued to grace the Parliament House at Edinburgh, would have soon extinguished the cultivation of the native language, and left it the mere dialect of the peasantry; but as a matter of fact, it turned out to be otherwise. There was a strong popular prejudice against the Union, the advantages of which were not at first perceptible; and this roused a deep feeling of nationality, apart from the old religious divisions, but generally combined with attachment to the House of Stewart. At this time appeared the first Scottish poet of true genius since the dark age of the country's literature set in—Allan Ramsay (q. v.), author of *The Gentle Shepherd*, which was published in 1725. Ramsay had also the merit of preserving some of those songs and ballads which have since become so famous, but whose authors are quite unknown. How far these works are the productions of an earlier age, and how far they are the composition of authors living in the 18th c., has been keenly discussed. Reference may be made to *The Romantic Scottish Ballads* of Mr Robert Chambers on the one side, and to *The Lady Wardlaw Heresy* of Mr Norval Clyne on the other.

It has been remarked that the stirring-up of national feeling which marked the first half of the 18th c. was connected with Jacobitism. To the deep attachment to the exiled line of kings cherished by a large party in Scotland, and to the interest awakened by the struggles in which this resulted, we owe the Jacobite songs, in which authors, generally unknown, poured forth their whole heart in chivalrous devotion to their Prince, or in defiance and scorn of the German strangers who now filled the throne of the Stewarts.

While these feelings were dying away under the influence of the mild government of George III., the close of the century was made famous by the appearance of the most illustrious of Scottish poets. It is almost needless to say a word of Robert Burns (q. v.). Admired by all ranks, he continues to be the chosen classic of the peasantry of the Scottish Lowlands. It is as an English writer that Sir Walter Scott is famous; but many of his lyrical pieces, and the dialogues in his novels, where the speakers use their own northern tongue, entitle him to be ranked as the last and greatest of Scottish writers.

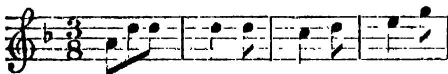
The best authority on the subject of this article is Professor Craik's *History of English Literature and the English Language*, the second edition of which was published in 1864. There is much valuable matter in David Irving's *History of Scottish Poetry* (Edin. 1861); but the author's dogmatism and love of theory frequently make him an unsafe guide.

SCOTTISH MUSIC. Scotland is famed for a class of national airs of a peculiar style and structure, possessing a wild, dignified, strongly marked, and expressive character. They are generally considered to be of great antiquity; the few notes on which the oldest of them turn, and the character of the modulation, lead to the inference, that they originated at a time when the musical scale and musical instruments of the country were in a rude state; but there is a deficiency of evidence regarding their early history. No musical MS. of Scottish airs is now known to exist of an older date than 1627; and we have no knowledge when and by whom the early Scottish melodies were composed, or how long they continued to be handed down traditionally from generation to generation. They may not improbably have been committed to notation in the 15th and 16th centuries; and their

disappearance is not wonderful, when we take into account, first, the strong measures resorted to, about 1530, by both civil and ecclesiastical authorities, to put down all ballads reflecting on the Roman Catholic hierarchy, and afterwards the fanatical proscription of music, along with every other innocent amusement, by the Puritans. The most valuable of now existing early collections of Scotch melodies is the Skene MS., in the Advocates' Library, noted down by Sir John Skene of Hallyards about the year 1630. It contains a number of native airs, mixed with some foreign dance-tunes—upwards of a hundred in all. Many of the Scotch melodies differ considerably from the more modern versions, presenting in general a ruder outline; but often exhibiting beauties which the changes which these airs have subsequently undergone have only tended to destroy.

Among the peculiarities which give its character to the music of Scotland, the most prominent is the prevalent omission of the fourth and seventh of the scale, and consequent absence of semitones, giving rise to such melodic forms as

or . Passages of this kind occur in all the airs of Scotland which have any claim to popularity, and form one of their most recognisable features. Another characteristic is the substitution of the descending for the ascending sixth and seventh in the minor scale, as at the beginning of the air called *Adew, Dundee*, in the Skene MS.—



A very prevalent course of modulation is an alternation between the major key and its relative minor, the melody thus ever keeping true to the diatonic scale of the principal key, without the introduction of accidentals. An air will often begin in the major key, and end in the relative minor, or the reverse. The closing note is by no means necessarily the key-note, a peculiarity especially remarkable in the Highland airs, which, if in a major key, most frequently terminate in the second; if in a minor, on the seventh. Closes are also to be found on the third, fifth, and sixth. The peculiarities of modulation of the music of Scotland have something in common with the modes of ancient ecclesiastical music, to which it may be more correctly said to belong, than to the modern major and minor keys; and the avoidance of the fourth and seventh may have originated in the imperfection of the ancient wind instruments; yet these peculiarities are not to be found in the national airs of other countries where ecclesiastical music may be supposed to have had the same influence, and the early instruments to have been equally imperfect.

Among the more modern printed collections of Scottish melodies with words, the most important are George Thomson's collection, with symphonies and accompaniments by Pleyel, Kozeluch, Haydn, Beethoven, Hummel, and Weber (vols. i.—iv., 1793—1805; vol. v. 1826; and vol. vi. 1841), one distinguishing feature of which was the appearance of Burns's words conjoined with the old melodies of the country; and a more recent collection in 3 vols., published by Messrs Wood & Co., and edited, with historical, biographical, and critical notes, by Mr G. F. Graham (1848—1849).

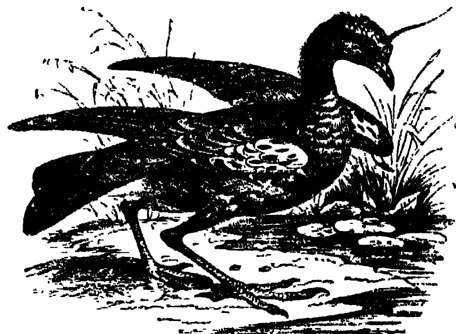
On the subject of Scottish music generally, reference is made to Dauney's *Ancient Scottish Melodies from a MS. of the Reign of King James VI., with an Introductory Inquiry Illustrative of the History of the Music of Scotland* (Edin. 1838).

SCOTUS AND SCOTISTS. See DUNS SCOTUS.

SCOUT, a person sent out in the front or on the flank of an army to observe the force and movements of the enemy. He should be a keen observer, and withal fleet of foot, or well mounted.

SCRAP-METAL, a term applied to fragments of any kind of metal which are only of use for remelting. Copper and brass scrap consist of the turnings from the lathe, and all useless and worn pieces, whether old or new. They are readily re-melted. Scrap-tin consists of the clippings and fragments of tinned iron and worn-out tinned vessels; these are frequently dipped into hydrochloric acid, to dissolve off the tin-coating from the iron; and the muriate of tin so formed is of commercial value for dyeing purposes. Scrap-iron consists of any waste pieces of iron, although the term is usually held to mean malleable iron only; and for many purposes it is particularly valuable, as it is found that a greater strength can be obtained by welding small fragments of iron together, than is found in large masses, the fibre being much more twisted and interwoven, from the mingling of pieces in every imaginable direction.

SCREAMER (*Palamedea*), a genus of birds of the order *Grallæ*, allied to the Jacanas (q. v.). The bill is rather short, conical, curved at the extremity; there is a bare space around the eyes; the toes are long; each wing is furnished with two strong spurs. The HORNED S., or KAMICHI (*P. cornuta*), inhabits swamps in Brazil and Guiana, and feeds on the leaves and seeds of aquatic plants. It is of a blackish-brown colour, nearly as large as a turkey, and has somewhat the appearance of a gallinaceous bird. It receives its name from its loud and harsh cry. From the head, a little behind the bill, there rises a long, slender, movable horn, of which no use has been conjectured. The spurs of the wings are supposed to be useful in defence against snakes and other enemies. Closely allied to this genus is the genus *Chauna*, or *Opistolophus*, to which belongs the CHAUNA, or CRESTED S. (*C.* or *O. chavaria*), a native of Brazil and Paraguay, the head of which has no horn, but is adorned with erectile feathers. The plumage is mostly lead-coloured and blackish. The wings are armed with spurs. It is very capable of domestication, and is sometimes reared with flocks of geese and turkeys, to defend them from vultures, being a bold and powerful bird.



Horned Screamer (*Palamedea cornuta*).

SCREEN, in Architecture, an enclosure or partition of wood, stone, or metal work. It is of frequent

use in churches, where it shuts off chapels from the nave, separates the nave from the choir, and frequently encloses the choir all round. Such screens are often much ornamented, the lower part being solid, and the upper very often perforated. The Rood-screen (q. v.) is that on which most labour is usually bestowed. In England, many beautifully carved screens in stone, enriched with pinnacles, niches, statues, &c., remain, such as those of York, Lincoln, Durham, &c.; and specimens in wood, carved and painted, are common in parish churches. In France, the screen round the choir is sometimes the subject of beautiful sculptures, as at Amiens and Paris. In Halls (q. v.) there was usually a wooden screen at one end to separate the entrance-door and a passage from the hall. Over this was a gallery. The term 'Screen of Columns' is also applied to an open detached colonnade.

SCREW, one of the Mechanical Powers (q. v.), is a modification of the Inclined Plane (q. v.), as may be shewn (fig. 1) by wrapping a piece of

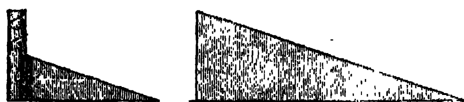


Fig. 1.

paper in the form of an inclined plane round a cylinder. In the screw, the spiral line, formed by the length or slope of the plane, is raised up in a ridge, and a lever is attached for the purpose of working it, so that the screw is really a compound machine, combining the lever and the inclined plane. It may be used as an instrument for penetration, as in the auger, gimlet, &c., or as a means of producing pressure, the latter being its most important application as a mechanical power. For this purpose, it is made to work in a 'female screw' or *nut* (a hollow cylinder grooved on the inside, so as to correspond to the threads of the screw); the nut is then firmly fixed in a massive frame (fig. 2), and the revolution within it of the screw causes the lower extremity of the latter to advance or recede. The principle of the screw's application is the same as that of an inclined plane pushed further and further under a heavy body so as to raise it up. Now in the inclined plane, P, the power or force, is to W, the weight raised or the pressure overcome, as the height of the plane to its base; that is, in the screw, as the distance between two threads is to the circumference of the cylinder. But as the twist is not applied at the circumference of the cylinder directly, but by means of a lever, it follows that the power applied, P, is to W, as the distance of two threads to the circumference described by P at the end of the lever. We see, then, that the power of the screw is increased by diminishing the distance between the threads; but as this cannot be effected without weakening the instrument, there is an evident limit to the increase of power in this way. The power can also be increased by lengthening the lever; but the best mode is that proposed by Mr Hunter (in the *Phil. Trans.* vol. 17), in which are employed two screws of different fineness, the coarser of them hollow and grooved, to act as a nut for the other. The outer and coarser screw is the one to which the power is applied by a lever, and it is adjusted in the manner before described; the inner is so fastened as to be capable of vertical motion only. When the outer screw is turned so as to move its extremity downwards, the inner screw moves upwards, but not to the same amount; thus, if the outer screw have 6 threads to the inch, and the inner one 7, one turn of the outer screw depresses it $\frac{1}{6}$th of an inch, but as the inner one rises $\frac{1}{7}$th of an inch, the whole descent of the point which produces pressure is only $\frac{1}{6} - \frac{1}{7}$, or $\frac{1}{42}$ of an inch; hence the pressure applied is 7 times greater than could be given by the outer, 6 times greater than could be given by the inner screw, and equal to what would be given by a screw with 42 threads to the inch, with the same power applied. The advantage of Hunter's screw is that the threads may be any thickness, and consequently each screw any strength, we please, provided the difference be small enough. The screw is one of the most powerful of the mechanical powers, but the friction generated by it amounts to about $\frac{1}{3}$d of the force applied.

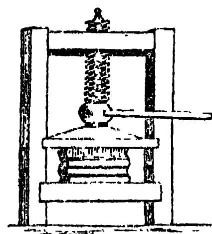


Fig 2.

SCREW-DRIVER, a chisel-shaped tool, used for turning round, and so driving in or drawing out the common joiners' screw-nails, the heads of which have a cleft made to receive the edge of the screw-driver.

SCREW PINE (*Pandanus*), a genus of plants of the natural order *Pandanaceæ*, natives of the tropical parts of the east and of the South Sea Islands. Many of them are remarkable for their adventitious roots, with large cup-like *spongioles*, which their branches send down to the ground, and which serve as props. Their leaves are sword-shaped, with spiny edges, and are spirally arranged in three rows. In general appearance, when unbranched, they resemble gigantic plants of the pine-apple, whence their popular name. *P. odoratissimus* is a widely diffused species; a spreading and branching tree of 25 feet high, much used in India for hedges, although it takes up much ground. In the south of India, it is called the Kaldera Bush. It grows readily in a poor soil, and is one of the first plants to appear on newly-formed islands in the Pacific. The male flowers are in long spikes, the female flowers in shorter branches. The flowers are frequently gathered before expanding, and boiled with meat. Their delightful and very powerful fragrance has made the plant a favourite everywhere, and it is the subject of continual allusions in Sanscrit poetry, under the name *Ketaka*. Oil impregnated with the odour of the flowers, and the distilled water of them, are highly esteemed East Indian perfumes. The seeds are eatable; and the fleshy part of the drupes, which grow together in large heads, is eaten in times of scarcity, as is the soft white base of the leaves. The terminal buds are eaten, like those of palms. The spongy and juicy branches are cut into small pieces as food for cattle. The leaves are used for thatching, and for making a kind of umbrella common in India, and their tough longitudinal fibres for making mats and cordage. The roots are spindle-shaped, and are composed of tough fibres; they are therefore split up by basket-makers, and used for tying their work. —More valuable, however, as a fibrous plant is an allied species, *P. sativus* or *P. Vacoa*, the Vacoa of Mauritius, which, if permitted, grows to a height of about 30 feet, but from continual cropping of its leaves, is usually dwarfed to six or ten feet. The fibres of its leaves are used for making the *Vacoa bags*, which constitute so considerable an article of

export from Mauritius, rivalling in cheapness and usefulness the Gunny Bags of India. The leaves are cut every second year, and each plant yields enough to make two large bags. Immediately on being cut off, the leaves are split into fillets, which are nearly an inch broad at the base, but taper to a point, and are three or four feet long. One of these will support a bag of sugar, of about 140 pounds, without breaking. The aërial roots of the Vacoa are so fibrous as to be used for making paint-brushes for coarse purposes.

SCREW-PROPELLER, The, is of the same construction as the common Screw (q. v.), but with the narrow thread exaggerated into a broad, thin

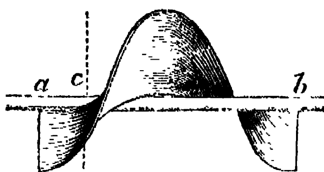


Fig. 1.

plate, and the cylinder diminished to a mere spindle. One complete turn of such a screw is shewn in fig. 1. Now, if a screw of this form were turned round in an unyielding substance, as wood, it would for each turn advance as much as the centre of the blade (or thread) had moved along the spindle in forming the screw, i. e., the distance *ab*. If the screw be fixed beneath a ship, and made to revolve in the water, the water takes the place of the wood; but as it is less stable than that substance, a certain part of the advancing power is lost, which loss is called the *slip* of the screw. In practice, this slip amounts to from 10 to 30 per cent.

It is obvious also that on the same spindle there may be more than one blade, provided that all the blades have the same pitch or rate of progression along the spindle (in fig. 1, *ab* is the *pitch* of the screw). Screws have thus been formed with two, three, four, and six blades or arms, but the form most commonly used is two blades for ships-of-war, and three blades in the merchant-service.

If the screw be cut off before attaining the length *ab* of a whole convolution, as at *c*, the portion *ac* will still retain all the properties of the screw. In the earlier attempts, screws were tried of the length of a whole convolution, or even two whole turns; but experiment has since shewn that this length is a disadvantage, and that the maximum of power is obtained from a screw whose length is $\frac{1}{6}$th of the pitch, i. e., where $ac = \frac{ab}{6}$. A screw of this length with two blades is shewn in fig. 2, being perhaps the most common form in use. The speed of a screw in a given time is equal to the pitch multiplied by the number of revolutions, and the product diminished by the slip.

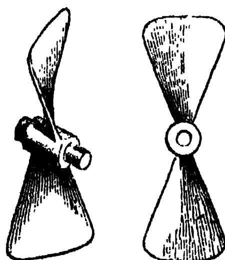


Fig. 2.

The following are the technical terms applied to the screw-propeller: The *shaft* or *spindle* is the cylindrical axis on which the screw revolves, and is the medium for communicating to it the power of the steam-engine; the *blade* is the thread of the screw; the *pitch*, the length of shaft on which the blade would make one complete turn; the *diameter* is the distance between the tips of opposite blades; the *length* is the fraction of the pitch actually employed; the *slip*, the loss of power from the yielding of the water.

The application of the screw to the propulsion of a vessel through the water is not new. In 1802, Dr Shorter, an English mechanician, produced motion by its agency; but his discovery was valueless, as the steam-engine had not then been practically applied to navigation. Those who first employed Watt's engine on board ship adopted the paddle-wheel, the success of which turned attention from the screw for nearly thirty years. At length, in 1832, Mr B. Woodcroft patented a screw-propeller with an increasing pitch; and four years later, Mr F. P. Smith patented a screw making two whole turns, which he reduced, in 1839, to one whole turn. In 1837, he and Captain Ericsson, an American inventor, brought the matter practically forward on the Thames, where a small screw-steamer, 45 feet long, 8 feet broad, and of 27 inches draught, towed the *Toronto* of 630 tons against tide at $4\frac{1}{4}$ knots an hour. In 1839, an American gentleman had the *Robert Stockton* built for him by Messrs Laird, with which he reached America. The British Admiralty, however, refused any support to the new propeller, until the success of the *Archimedes*, built in 1840, of 232 tons and 80 horse-power, which was exhibited at the principal ports, rendered opposition no longer possible. The Admiralty, then, as an experiment, constructed the *Rattler*, from the trials of which vessel nearly all the subsequent data for the screw have been derived. Meanwhile, in 1838, Mr James Lowe had shewn that the length of the screw should not exceed $\frac{1}{6}$th of the pitch; and after actual and successive trials, the screw of the *Rattler* was cut down from 5 feet 9 inches to 1 foot 3 inches. These experiments established the screw as a rival to the paddle-wheel; and its advantage for ships of war became incontestable, as, from the entire submergence of the propeller, and consequent lowness of its engines in the ship, the chances of injury from an enemy's shot were reduced almost to nothing. Some of the great steam-companies—notably the Peninsular and Oriental Company—also patronised it, and it was found of great value as an auxiliary in sailing-vessels. The result is that, at this time (1865), its use in the British navy is almost universal, and in the merchant-service few large vessels are built which have not a screw, at least as an auxiliary.

Several varieties of screw, have been introduced, each finding many supporters. Perhaps the most efficient, under all circumstances, is Griffith's, which is shewn in fig. 3. Here the blades, in place of rising from the shaft itself, spring from a hollow sphere occupying one-third the screw's diameter. This arrangement was adopted because experiment proved that the central portions of the blades of the ordinary screw absorb about 20 per cent. of the propelling power, while they produce little useful effect, from the circumstance, that at that part (especially in screws of a coarse pitch) the blade is nearly in a line with the shaft, and acts at right angles on the water, causing only a disturbance of that portion on which the outer and more powerful end of the blade operates. The globe, on the other hand, revolves with little

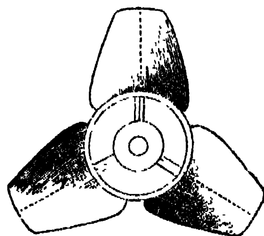


Fig. 3.

friction. The blades are also less liable to be wrenched off by the resistance of the water, and the vibration on board is considerably less than with the common screw. Of other screws may be mentioned Ericsson's, in which the sphere-principle of Griffiths is extended to the use of a ring of metal, with numerous short blades round its periphery. Messrs Carlsrund and Sorensen, of the Swedish navy, reverse this process, and have the blades within the periphery. In the present year (1865) Mr Rig has effected further improvements, by which a large proportion of the power is employed nearly parallel to the shaft. This is brought about by inserting behind the moving screw a fixed screw with the blades turned in an opposite direction.

One difficulty in the use of the screw as an auxiliary in sailing-ships is, that in a good wind, from the speed imparted by the sails, the ship sometimes outruns the screw; and the result is, that either the screw seriously impedes the sailing, or the blades are twisted off the shaft. To prevent this, various devices are resorted to. In some cases, the screw is disconnected from the shaft, and left to revolve freely; in others, as in most ships of war, it is disconnected and hoisted altogether out of the water by means of an iron framework worked above the screw in a sort of well. Messrs Maudslay have patented a 'feathering-screw,' which, by a simple apparatus, can, when the steam-power is not required, have the blades turned into a line with the ship's keel, and the screw (which must be two-bladed) fastened in a vertical position. When thus treated, the screw is out of danger, and forms no impediment to the ship's progress.

The usual position for the screw is in the deadwood immediately before the stern-post, the shaft on which it revolves passing, parallel to the keel, into the engine-room. To give it full effect, the stern lines should be very fine, so that the water has a full sweep over it. In 1860, Messrs Dudgeon of London produced a steamer with twin screws, one under each quarter. These have independent action, and as one can therefore be reversed while the other goes ahead, great steering-power is imparted; so much so, that vessels constructed on this principle are said to be able to turn in their own length. In the new cigar-shaped yacht building (1865) at Millwall, for an American gentleman, there is a screw propeller at each end. As the action of the screw depends on the comparative immobility of the water in which it acts, it is necessary, for the development of its full power, that it should be completely immersed, and that there should be nearly two feet of water above the top of the upper blade. It follows from this that, *ceteris paribus*, the screw-vessel will draw more water than the paddle-steamer; for in large steamers the screw is from 15 to 18 feet in diameter, and in the *Great Eastern* it reaches 24. The revolutions vary from 50 to 72 per minute.

It now only remains to notice the comparative advantages of the paddle and screw. Under favourable circumstances, in ships of equal tonnage and power, there is little difference in speed or force. Before the wind, the paddle has a slight advantage; with the wind ahead, the resistance offered by the paddle-boxes transfers the advantage to the screw. Fastened stern to stern, the screw-ship drags the paddle-ship; but fastened bow to bow, the same result is not found. This is, however, rather to be attributed to the loss of power in a paddle-ship when not in progress (see PADDLE WHEEL), than to any actual superiority of screw. In a long voyage, however, the gain is distinctly with the screw; because the weight of fuel borne at starting sinks the paddles too low in the water, and probably its exhaustion at the end of the voyage deprives them of their proper dip; whereas, with ordinary management, the screw will always be immersed. Again, rolling deprives the paddle of much power; while pitching deprives the screw of its proper matrix; but the balance of loss, in tempestuous weather, is in favour of the screw. It has been already shewn that in men-of-war the screw is the most useful agent; and, as an additional reason, may be adduced the clear broadside which it allows for the guns. On the other hand, in point of comfort to the passengers, the advantage lies unquestionably with the paddle; for the rapid revolution of the heavy screw on a shaft extending half the ship's length, produces a continuous and very unpleasant vibration; while the lower position of the engines and screw give the vessel a deep roll. The paddles in the paddle-steamers act as outriggers, and the centre of gravity being, from the position of the engines, higher (as will be understood from the outline in fig. 4), a much softer motion is imparted to

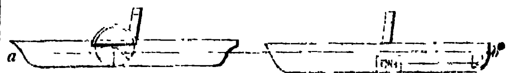


Fig. 4.
ab, water line.

the whole vessel. For lakes and rivers, where the water is smooth and the voyage short, paddles are best, and more especially so when the water becomes often shallow or is choked with weeds, which would soon clog the screw.

It is proper to observe that some eminent engineers deny that the action of the screw-propeller is to be assimulated to that of an ordinary screw making its way through wood. They assert that the motion of the ship is caused by the pressure of the solid water from behind the screw, while the action of the screw creates a void in its front. In proof of this, experiment has shewn that if a disc be placed *before* the screw and the screw still worked forwards, the ship moves backwards, while, with the same motion of the screw, a disc *behind* it causes the vessel to move forward. Others, however, think that this effect of the disc can be sufficiently accounted for on the usual theory of the screw's action.

SCREW-WRENCH, a tool used for grasping the flat sides of the heads of large screws, such as are used in engines and other large works. The heads

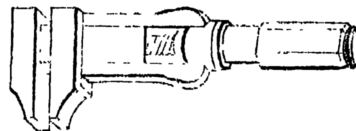


Fig. 1.

are usually octagonal laterally, and the wrench is made of two portions like hammers sliding one upon the other (fig. 1), so that screw-heads can be grasped of different sizes, and the handle forms the lever



Fig. 2.

by which they are turned round. The screw-key (fig. 2) is only a more simple kind of wrench, which will only act upon screws of two sizes, fitting the jaws at each end.

SCRI'BBLER. See SPINNING.

SCRIBE (Heb. *Sofer;* Gr. *Grammateus, Nomodidaskalos*), among the Jews, originally a kind of military officer, whose business appears to have been the recruiting and organising of troops, the levying of war-taxes, and the like. At a later period, especially at the time of Christ, it had come to designate a learned man, a doctor of the law. Christ himself recognises them as a legal authority (Matth. xxiii. 2); they were the preservers of traditions, and form a kind of police in the Temple and synagogues, together with the high-priests; and the people reverenced them, or were expected to reverence them, in an eminent degree. They were to be found all over the country of Palestine, and occupied the rank and profession of both lawyers and theologians. Their public field of action was thus probably threefold: they were either assessors of the Sanhedrim, or public teachers, or administrators and lawyers. Many of these teachers had special class-rooms somewhere in the Temple of Jerusalem, where the pupils destined to the calling of a Rabbi sat at their feet. The calling of a Scribe being gratuitous, it was incumbent upon every one of them to learn and to exercise some trade. Those Scribes who were not eminent enough to rise to the higher branches of their profession, to enter the Sanhedrim, to be practical lawyers, or to hold schools of their own, occupied themselves in copying the Book of the Law or the Prophets, in writing phylacteries, contracts, letters of divorce, and the like. Their social position was naturally in accordance with their talents and their importance. The apostles, not learned enough, for the most part, to be Scribes, are promised to become 'Scribes' of the kingdom of God, &c. See PHARISEES, HALACHA, HAGGADA, MIDRASH, MISHNA, TALMUD.

SCRIBING, in Joinery, fitting the ends of pieces of wood together, so that the fibres may be at right angles, and the end cut away across the fibres.

SCRIP is a certificate (usually about the size and appearance of a bank-note) of a person's share or shares in a joint-stock undertaking. It is issued on the party signing a contract of copartnery, and is retained by him until an act of the legislature, or some other formality, establishes the company, and authorises the opening of regular books for entering the names of shareholders and the transfer of stock. In many instances, scrip is unauthorisedly sold, and made an object of speculation; the party to whom it was assigned, however, remains bound by the contract which he has subscribed, until relieved of his obligations by transfer in the books of the company.

SCRO'FULA, or **SCROPHULA**, was, until the last quarter of a century, regarded as consisting essentially of indolent glandular tumours, occurring frequently in the neck, suppurating slowly and imperfectly, and healing with difficulty. Recent pathologists, however, have given a more extended meaning to the word *scrofula*. According to them, it signifies a certain disease or defect of the constitution, in which there is a tendency to the production and deposition of a substance called *tubercle* in various tissues and organs; and tubercle must thus be regarded as the essential element of scrofula. It does not follow, however, that a deposit of tubercle should actually occur in every case of scrofula. The *tendency* is present, and the absence or presence of the deposit depends upon the extent of the affection, and is determined by various causes.

Mr Paget, one of the most eminent of our living pathologists, very clearly sums up what is generally understood by scrofula in the following paragraph: 'It is a state of constitution distinguished in some measure by peculiarities of appearance even during health, but much more by peculiar liability to certain diseases, including pulmonary phthisis. The chief of these "scrofulous" diseases are various swellings of the lymphatic glands, arising from causes which would be inadequate to produce them in ordinary healthy persons. The swellings are due sometimes to mere enlargement, as from an increase of natural structure, sometimes to chronic inflammation, sometimes to an acute inflammation or abscess, sometimes to tuberculous disease of the glands. But besides these, it is usual to reckon as "scrofulous" affections certain chronic inflammations of the joints; slowly progressive "carious" ulcerations of bones; chronic and frequent ulcers on the Cornea, Ophthalmia [q. v.], attended with extreme intolerance of light, but with little, if any, of the ordinary consequences of inflammation; frequent chronic abscesses; pustules, or other cutaneous eruptions, frequently appearing upon slight affection of the health or local irritation; habitual swelling and catarrh of the mucous membrane of the nose; habitual swelling of the upper lip.' It is obvious that although the above-named forms of disease are often more or less coincident, they have nothing sufficiently in common to justify the general appellation of *scrofulous*. They are certainly not all tuberculous diseases, and hence Mr Paget doubts whether the proposal to make *scrofulous* and *tuberculous* commensurate terms is practical, since the former, as generally employed, has a much wider significance than the latter.

The word is derived from the Lat. *scrofa*, a sow, it being supposed that this animal was especially liable to tumours such as occur in this disease. The Greek and Arabic names for the disease are similarly derived from the words signifying 'swine' in these languages. While *scrofula* was the popular, *struma* (supposed to be derived from *struo*, I heap up) used by Celsus, Pliny, and other Latin writers, was the classical name for the disease. The vulgar English name, *The King's Evil*, is derived from the long-cherished belief that scrofulous tumours and abscesses could be cured by the royal touch. Multitudes of patients were submitted to this treatment, and, as the old historians assert, with perfect success, from the time of Edward the Confessor to the reign of Queen Anne. The writer of the article 'Scrofula' in *The English Cyclopædia*, mentions the curious historical facts that 'the old Jacobites considered that this power did not descend to Mary, William, or Anne, as they did not possess a full hereditary title, or, in other words, did not reign by divine right. The kings of the house of Brunswick have, we believe, never put this power to the proof; and the office for the ceremony which appears in our Liturgy as late as 1719 has been silently omitted. The exiled princes of the house of Stuart were supposed to have inherited this virtue. Carte, in the well-known note to the first volume of his *History of England*, mentions the case of one Christopher Lowel, who, in 1716, went to Avignon, where the court was then held, and received a temporary cure; and when Prince Charles Edward was at Holyroodhouse in October 1745, he, although only claiming to be Prince of Wales and regent, touched a female child for the king's evil, who in 21 days is said to have been perfectly cured.' The practice was introduced by Henry VII. of presenting the patient with a small coin (gold or silver). The accompanying is an engraving of the identical touch-piece presented to Dr Johnson (Lent 1712—when he was only thirty months old), who was one of the persons touched by Queen Anne.—The French kings also touched for the 'Evil,' the practice being

traced back to Clovis, 481 A. D. On Easter Sunday, 1686, Louis XIV. is said to have touched 1600 persons, using the words: *Le roy te touche, Dieu te guerisse* (the king touches thee, may God cure thee). See Chambers's *Book of Days*, i. 82. The



Touch-piece (time of Queen Anne).

literature of this curious subject is somewhat extensive. The reader who wishes to pursue the inquiry further is referred to Tooker's *Charisma, sive Donum Sanctionis*, &c., 1597; Browne's *Charisma Basilicon, or the Royal Gift of Healing Strumæs*, &c., 1684; and Beckett's *Free and Impartial Inquiry into the Antiquity and Efficacy of Touching for the King's Evil*, 1722. The subject is also examined by Bishop Douglas in his *Criterion, or Miracles Examined*, 1754; by Colquhoun, in his *Isis Revelata*, 1836 (who attributes the cure to animal magnetism); and by Howitt in his *History of the Supernatural in all Ages and Nations*, 1863.

Scrofula is a disease of early life, and when it does not exhibit any of its manifestations before the period of maturity it seldom shews itself afterwards.

In all systematic descriptions of this disease, two varieties of the scrofulous habit or diathesis are given, viz., the *sanguine* or *serous*, and the *phlegmatic* or *melancholic*. In the *sanguine*, there is a general want of muscular development, the limbs being soft and flabby; the skin is fair and thin; the features are delicate, the rosy hue of the cheeks contrasting strongly with the surrounding paleness; the eyes are gray or blue, and the eyelashes long and silken; the hair fine and light coloured or reddish; and the end of the fingers broad and expanded, with convex nails bent over them; the intellect is lively and precocious, and there is often considerable beauty. In the *phlegmatic* variety the skin is pale or ruddy, dark, and often harsh; the general appearance dull and heavy; the hair dark and coarse; and the mind usually slow and torpid.

Children in whom the scrofulous constitution is strongly marked often present that narrow and projecting form of the chest to which the term 'pigeon-breasted' is commonly given; moreover, the abdomen is enlarged, the limbs wasted, and the circulation languid, in consequence of which they are especially liable to chilblains. The digestive organs are so commonly affected—as is evidenced by irregular action of the bowels, fetid breath and evacuations, furred tongue, capricious appetite, &c.—that, in the opinion of the late Dr Todd, 'strumous dyspepsia presents a more characteristic feature of this habit of body than any physiognomical portrait that has been drawn of it.' In the great majority of cases the scrofulous disposition is hereditary; indeed, there is no disease which is nearly so often transmitted from parent to offspring as scrofula. There is, however, scarcely any doubt that it may be acquired under the action of various unfavourable exciting causes, which may be ranked together 'as causes of debility.' Amongst them may be especially noticed (1.) Insufficient and improper food; (2.) Impure air; (3.) Insufficient exposure to direct sunlight; (4.) Exposure to wet and cold, and to sudden changes of temperature, especially if the clothing be insufficient; (5.) Excessive and continued fatigue, whether bodily or mental; and (6.) Intense and prolonged anxiety or mental depression.

We shall first lay down the general principles of treatment to be adopted with the view of improving the health in the case of a person presenting either merely the general indications of a scrofulous habit of body, or some of its local manifestations, and we shall then conclude with a brief notice of a few of those particular forms of the disease which most frequently come under the attention of the medical practitioner.

The diet should be nutritious and sufficiently abundant, and animal food should be given at least twice daily. Dishes containing eggs and milk may usually be taken with advantage. If the patient is not very young, a little bitter ale taken at an early dinner will often promote digestion; if, however, it causes flushing or much sleepiness, it must be discontinued. A mother with scrofula should always provide a healthy wet-nurse for her child, as suckling in such a case is injurious both to parent and offspring. Flannel should always (both in summer and winter) be worn next the skin during the day, and the clothing must always be sufficient to keep the extremities warm. Constant residence in pure and dry air should be enforced as far as possible. Unfortunately, the climate of Great Britain is by no means favourable to those possessing the scrofulous habit, and it is often very difficult for the physician to decide as to the choice of the most suitable residence. On this subject, Mr Savory, in his essay on 'Scrofula' in Holmes's *System of Surgery*, vol. i., 1860, remarks that 'it is surely a mistake to suppose that a warm climate is the best adapted to all cases of scrofula. It is doubtless so in the great majority in which the disease [in the form of pulmonary consumption] is far advanced; but in many cases at an earlier stage, its further development is more satisfactorily arrested and the general health improved by a more bracing air. Children with tuberculous glands, but whose general health appears otherwise tolerably good, would perhaps profit less by transportation to Madeira or Egypt than by residence in the south-west coast of England, where the atmospheric changes are less frequent and sudden than in other parts of the kingdom, and the winter is comparatively mild. Delicacy of constitution is sometimes increased, and mischief encouraged, by dread of exposure.' Free exercise of the muscles and lungs in the open air should be insisted on in fine weather, and if this cannot be taken, the best substitute is friction over the surface of the body with the flesh-brush. Patients who can bear cold sea-bathing during the summer and autumn months will derive great advantage from it; but if a short immersion is not rapidly followed by a genial glow after drying the skin, such bathing is injurious, in which case warm salt-baths will be found useful. Too much stress cannot be laid upon the fact that in the case of children the mind should be cheerfully occupied, but not overtasked. The medicines most esteemed in the treatment of scrofula are iodine and its compounds, the salts of iron, bark, sarsaparilla, the alkalies and mineral acids, and, above all, cod-liver oil. As the choice of the individual remedy must be left to the physician, we will merely remark that iodine and iron may often be advantageously prescribed together either in the form of the syrup of the iodide of iron, or of a well-known French preparation known as Blancard's Iodide of Iron Pills; and that

to derive full benefit from cod-liver oil, it must be taken for a long time. As Mr Savory remarks, the oil should be regarded as an article of diet rather than a medicine. A tablespoonful may be considered as a full dose for an adult; but this quantity should be gradually arrived at, the dose commencing with a teaspoonful. It is most easily taken when floating on a mixture of orange wine, or some other pleasant bitter fluid, with water. The lightest and clearest oil is probably the best, and in cold weather it should be slightly warmed before it is taken, for it is thus rendered more liquid and more easily swallowed. If what are commonly known as 'bilious symptoms' supervene, the use of the oil should be suspended for a couple of days, and a few gentle aperients should be prescribed.

Excluding pulmonary consumption, in which the leading pathological feature is the deposit of scrofulous matter or tubercle in the lungs, one of the forms of scrofula which most frequently presents itself is in the *lymphatic glands*, especially of the neck. The gland or glands may first become enlarged, either from an attack of acute inflammation, or from an indolent and painless deposit of tubercle. They may remain in this state either stationary or slowly enlarging for years, till from some accidental local irritation, or from some constitutional disturbance, they inflame and suppurate. After the discharge of the matter, the ulcerated skin usually heals with an ugly puckered cicatrix, which generally remains as a disfiguring mark through life. The local treatment consists in attempting to disperse the tumour, if it is hard and painless, by painting it with tincture of iodine, or by the application of iodine ointment. If it is soft, and likely to suppurate, the process may be facilitated by the application of warm water dressing or emollient poultices. When there is undoubted fluctuation, indicating the presence of pus or matter, it is usually regarded as the best practice to open the abscess with a narrow-bladed bistoury; but some surgeons still prefer allowing the matter to make its own way to the surface. The necessary internal treatment is that which has been already described. The *skin*, especially behind the ears, about the mouth, nostrils, and eyelids, and on the scalp, is liable to pustular diseases of a scrofulous origin. The free use of soap and water, followed by the application of black wash or zinc ointment, and proper constitutional treatment, will generally effect a cure, except in the horrible form of scrofulous ulceration of the skin of the face known as *Lupus* (q. v.). Amongst other well-known and very serious scrofulous affections must be mentioned *Acute Hydrocephalus* and *Mesenteric Disease*, to which special articles are devoted. There is a peculiar and very intractable form of ulceration known as the *scrofulous ulcer*, which will be noticed in the article on ULCERS. The physical, chemical, and microscopical characters of the peculiar morbid deposit, to which reference has frequently been made in this article, will be found under the head of TUBERCLE and TUBERCULOSIS.

SCROFULOUS or Tuberculous Diseases are common amongst cattle, sheep, and pigs. In early life the tubercle is laid down in the mesenteric glands, and occasionally about the joints. Along the exposed eastern coasts of Britain, scrofulous swellings are also met with about the head and neck; in some of the great grazing districts, the mucous membrane of the bowels is affected, constituting dysentery; but, as in man, the lungs are the most common site of tubercle, which here gives rise to pulmonary consumption. Scrofula in all its forms is hereditary, hence animals with any such taint should be rejected as breeding stock. It is induced and fostered by 'breeding in and in.' It may be developed, and is always aggravated, by debilitating influences, such as bad food, or exposure to wet or cold. Prevention is insured by breeding only from healthy vigorous parents, and allowing the stock at all times adequate food and shelter.

SCROLL, an ornament of very common use in all styles of architecture. It consists of a band arranged in convolutions, like the end of a piece of paper rolled up. The Greeks used it in their Ionic and Corinthian Styles (q. v.); the Romans in their Composite; and in medieval architecture, and all styles which closely copy nature, it is of constant occurrence as in nature itself.

SCROPHULARIA'CEÆ, or SCROPHULARI'NEÆ, a natural order of exogenous plants, consisting chiefly of herbaceous and half-shrubby plants. The calyx is inferior, persistent, divided into five (sometimes four) unequal divisions. The corolla is monopetalous, more or less irregular, often two-lipped, exhibiting great variety of form; in the bud it has five (sometimes four) segments. The stamens are usually four, two long and two short, sometimes two, rarely five. The ovary is 2-celled, with many ovules; the style simple, the stigma generally 2-lobed. The lobes of the stigma sometimes display much irritability. The fruit is a capsule, or rarely a berry.—This order is a very large one, containing almost 2000 known species, which are distributed over the whole world, both in cold and warm climates. Acridity and bitterness are prevalent characteristics, and many species are poisonous. Some are root parasites. Some are admired and cultivated for their flowers; some are used medicinally. *Digitalis* or Foxglove, *Calceolaria*, *Mimulus*, Mullein, *Antirrhinum* or Snapdragon, *Gratiola*, *Scrophularia* or Figwort, *Veronica* or Speedwell, and *Euphrasia* or Eyebright, are familiar examples. Very different from these humble herbaceous plants is *Paulownia imperialis*, a Japanese tree, 30 to 40 feet high, with trunk two or three feet in diameter, and flowers in panicles, about as large as those of the Common Foxglove.

SCRUPLE (Lat. *scripulum*, *scriplum*, or *scrupulum*) was the lowest denomination of weight among the Romans, and with them denoted the 24th part of an ounce (*uncia*), or the 288th of a pound (*libra*). As a measure of surface it was also the 24th part of the *uncia*, and the 288th of an acre (*jugerum*); seeming, in fact, to be the 24th of the 12th part of any unit. In later Roman times it became the name of the 60th part of an hour, and corresponded to our 'minute.' The 'minute' being the *scrupulum*, the 60th part of a minute was called a *scrupulum secundum* (whence the derivation of our word 'second'), the 60th part of this a *scrupulum tertium*, and so on. Lexicographers define 'scrupulum' to be a small pebble, such as would be likely to find its way between the sandal and the foot, whence the use of the term to signify a small difficulty or objection.—The term at the present time is a denomination in that modification of Troy weight which is used by apothecaries; it contains 20 Troy grains, is the third part of a drachm, the 24th of an ounce, and the 288th of a Troy pound.

SCUDERY, MADELEINE DE, a once notable French novelist, was born at Havre in 1607. Left an orphan at the age of six, she, along with a brother named Georges, was carefully educated by one of her uncles. While still young, she left Normandy for Paris, was admitted to the Hôtel Rambouillet (see RAMBOUILLET), and soon became one of the oracles of the brilliant society that assembled there. It was in this famous but showy circle that Mademoiselle S. gathered that immense fund of watery sentimentalism, platonic

gallantries, 'polished' conversation, dull ceremonial incidents, affectations of moral purism, &c., which make up the tedious contents of her romances—*romans de longue haleine* (long-winded romances), as they have been felicitously nicknamed. Their popularity for a brief period was painfully wide. Everybody with the slightest pretensions to 'taste,' except the Port-royalists, Bossuet, and a few critics of the stricter sort, professed a boundless admiration for them. The bishops in general—as Camus, Mascaron, Huet, Godeau, Fléchier, Massillon—were in raptures, and studied the stately trash with an ardour that considerably diminishes our respect for their understanding. When the troubles of the Fronde had broken up the gatherings at the Hôtel Rambouillet, Mademoiselle S. organised a literary circle of her own, which met every Saturday at her house in the Rue de Beauce. These 'Saturdays' began very well; but gradually they degenerated, and became ridiculous—pedantic and blue-stockingish they had been from the very first. Nothing further in Mademoiselle S.'s life calls for notice. She died at Paris, 2d June 1701, at the advanced age of 94, honoured and respected to the last; and it is but fair to admit that she seems to have been worthy of the regard in which she was held, being herself a perfect pattern of those watery virtues and superfine excellences of demeanour that she loved to depict. Her principal works (never again to be read in this world) are: *Ibrahim, ou l'Illustre Bassa* (Par. 4 vols. 1641); *Artamène, ou le Grand Cyrus* (Par. 10 vols. 1649—1653); *Clélie, Histoire Romaine* (Par. 10 vols. 1656); *Almahide, ou l'Esclave Reine* (Par. 8 vols. 1660); *Les Femmes illustres, ou les Harangues Héroïques* (Par. 1665); 10 vols. of *Conversations Nouvelles, Conversations Morales*, and *Entretiens de Morale* (1680—1692); besides *Lettres*, and *Poésies légères*, &c.—See Victor Cousin's *La Société Française au Dixseptième Siècle.*

SCU'DO (Ital. shield), an Italian silver coin, corresponding to the Spanish *piastre* (q. v.), the American dollar (q. v.), and the English crown (q. v.). It was so called from its bearing the heraldic shield of the prince by whose authority it was struck, and differed in value in the different states of Italy. In Rome, where it is called the *scudo Romano* or *scudo nuovo*, it is equal to 4*s.* 3*d.* sterling; and is subdivided into 10 *paoli* or 100 *bajocchi*. The Venetian scudo, or *scudo della croce*, was of higher value than the Roman one; while, on the other hand, the old scudi of Bologna, Genoa, and Modena are inferior to it in value. Scudi are now gradually disappearing from the provinces of the Kingdom of Italy before the new decimal coinage, but the name is sometimes given to the piece of 5 lire, equivalent to a 5 franc piece in the French coinage. Scudi of gold are also struck in Rome, the *scudo d'oro* being equivalent to 10 *scudi di argento*. See PIASTRE.

SCULL, SCULLING. A scull differs from an oar in size only. It is shorter, and less heavy. A man can only manage one oar; but he can pull with a pair of sculls, the ends of which lap over very little, or else do not meet within the boat.

Sculling has two senses, a river sense and a sea sense. In its freshwater acceptation, sculling is the act of propelling a boat by means of sculls in pairs. Among seafaring men, however, to scull is to drive a boat onward with one oar, worked like a screw over the stern.

SCU'LPTURE, the process of graving or cutting hard materials; from the Lat. *sculpo*, in Gr. *glypho.* Its common application is to artistic carving or cutting. Sculpture is the art of expressing ideas or images in solid materials. In this sense processes which do not, strictly speaking, involve the cutting of hard substances are included in the term. Sculpture, as an art, includes the moulding of soft materials as well. Clay, and even wax, have been in all ages of the art employed, sometimes for the purpose of sketches or models for reproduction in marble or metal, sometimes as the material of the finished work. The art of sculpture is as old as any that has been handed down to us. The Scriptures allude to the working of brass and other metals in the beginning of human society, and we read of the images of Laban carried off by his daughter. The great nations of antiquity all practised it, though only Nineveh and Egypt have left us anything like a fair representation of the state of the art in those early times. From the nature of this art its productions have proved more durable than those of painting, and have come down to us in more numerous instances even than works of architecture. While the latter have been destroyed, and their materials used up, works of sculpture, being smaller, have remained buried, and from time to time have been reproduced for the instruction and enjoyment of modern nations.

As an art, or means of recording facts and representing ideas, sculpture has many disadvantages as compared with painting, neither colour nor picturesque backgrounds being properly admissible in sculpture. To this rule, however, we shall find exceptions in the works of Ghiberti in the 15th century.

Sculptures are distinguished by different terms, according to the nature and completeness of the work. Groups or figures completely represented are said to be 'in the round.' Those only partially detached from the mass or background are said to be 'in relief.' This, again, is called 'high' or 'low relief,' according as the figure stands fully or slightly above the mass behind it. The ancient Egyptians employed another kind of relief, their figures being sunk below the surface, and only the prominent portions remaining level with it. In this case the background or unoccupied space is not cut away, but the figures are worked downwards into it. Another process is called 'intaglio,' the whole figure being regularly designed and moulded, but 'cut into' the material and inverted. This is usually applied to the making of gems and seals. Another sculptural process is that used in the treatment of metals. As metals are both harder than stone and more valuable, it is not possible to cut or grave works out of masses of metal as is done in stone or gems. The metal is fused by heat, and the form is given it while in that state. This is done by first forming or moulding the design in clay or other soft material. Round the model thus formed, a mould is formed of sand, which is prepared and pressed round it in a wet state till it takes the complete form of the model, which is then removed, and the liquefied metal poured in. It takes the exact shape of the model by this means. These are said to be 'cast,' because of the casting of the liquid metal into the mould. Other processes, however, have, in the finer works, to be applied. The metal retains the rough surface of the sand in which it has chilled. It is therefore worked over with a graving tool, to give it a final surface, and express every delicacy of form intended by the artist. In some cases this 'engraving' is in the form of ornamental design, such as dress, &c. Sometimes the whole design is engraved without any previous casting. In this case the metal has had its form given by 'hammering' or 'beating.' The metal, hot in the case of iron or bronze, or cold in the case of silver and gold, softer metals, is beaten on the anvil into its form. A coarser and deeper method of engraving is called

'chasing,' where deeper sinkings and bolder prominence are given to the different parts of the design.

Of moulding we have already spoken. We may now remark on the materials in use for these various purposes. In sculpturing, or cutting designs or figures, we generally find marbles have been employed; the most famous having been the 'Parian,' from the Isle of Paros, and the Pentelic, from the mountain of that name in Attica. Besides these, the ancients used numerous marbles—white, and latterly coloured: the late classical sculptors sometimes employing both white and black, or coloured, in lumps on the same work, the coloured marble being used for the dress or hair as it might be. The Egyptians, besides the use of these materials, and various kinds of fine and coarse-grained stone, employed porphyry, purple and black, an exceedingly hard and difficult material to handle. The modern sculptors have used the white marble of Carrara in Italy, an excellent material, but liable to veins and discolorations, which are unfavourable to the art. 'Terra Cotta,' or burnt clay, was extensively in use both in ancient and modern times; the clay being moulded to the utmost delicacy while soft, and then baked to a red colour. Singularly fine reliefs remain to us from the Etruscans and Greeks, as well as from Egypt and elsewhere, as may be seen in the British Museum. It has also been extensively used in modern times. The Egyptians modelled little figures in porcelain clay, and coloured and enamelled them after the fashion of porcelain, and vast numbers of such are in most of our museums. The word 'toreutic,' from the Greek word *toreuo*, to pierce or bore, is usually applied to sculpture in metal. For this the metal most appropriate, and most generally used both in ancient and modern times, is 'bronze,' a mixture of copper and tin. It is also known as 'brass.' Other metals, in small quantities, were also introduced, and various kinds of bronze have resulted from this variety, as well as from the proportions of the two principal metals, the method of fusion, &c. Egina, Delos, and Corinth made different kinds of bronze, each of excellent quality. Besides this favourite metal, gold, silver, copper, and even lead, and mixtures of lead and tin, 'pewter,' have been used for artistic sculpture. In the celebrated period of Greek sculpture, gold and ivory were used together. These statues, two of which were made by Phidias, were called 'chryselephantine'—that is, of gold and ivory.

The ordinary modes of proceeding in sculpture have been very various; whether the more celebrated sculptors of ancient times cut out their designs at once without the previous rehearsal of a model, we do not know. It is, however, very probable. The Egyptian bas-reliefs may still be seen in some of their tombs, lined out, and corrected afterwards by a master's hand previous to execution. Michael Angelo, the most powerful of modern sculptors, is known to have worked many of his statues, without the use of any model, out of the blocks. Florence, and the Louvre (Paris), contain marble sketches or unfinished figures thus roughed out. The length and size of the chisel-marks shew how boldly this great master went to work to within $\frac{1}{8}$th of an inch of his final surface. As, however, there can be no putting on of any of the substance of stone once reduced by inadvertence, the artist commonly makes his sketch or design, in small, in clay. This is subsequently enlarged, and then studied from 'the life;' that is, men, horses, draperies, &c., the most suitable to the artist's present purpose are selected, and with these before him, he corrects his design and perfects it while the material is soft. A mould is then taken, as in the case already described, and with a plaster instead of a metal cast before him, the artist proceeds to work on his marble. The cast being placed on one block, and the marble on one precisely similar, workmen proceed to place a needle on a measuring-rod, the rod resting against the block till it touches a point of the cast. The needle is then applied to the block on which the marble stands, and this is bored into till the needle touches it as it did the cast. In this way the distance of the various surfaces of the future figure from the outside of the unshaped marble are ascertained, and the workmen rough out the figure down to those measurements. The sculptor then gives the final and delicate touches that finish it, himself. Finally, it is brought smooth with pumice-stone or sand. Michael Angelo and some of the ancients actually polished their statues. This, however, is generally objected to, as the sharp points of reflected light injure the general effect of the form.

We must notice one other question relative to sculpture before proceeding to a short review of the art historically, that is colour. The ancients—that is, Egyptians, Ninevites, and others—did colour their statues, intending, probably, to do so up to 'life'—that is, to a direct imitation. The Greeks, too, employed colour on their statues, certainly on their architecture. To what extent they coloured their statues, it is not very easy to determine. Partly, indeed, time has so altered, and partly so obliterated the colouring material, that we can only form an approximate judgment. It seems probable that the colouring was conventional, that is, that colour was used to add to the splendour and distant effect of the work, rather than to attempt any positive imitation of real life. A head in the Elgin Room of the British Museum has been coloured, the hair full red. The eyes are completely cut out, so as to shew dark and shadowy hollows, even with the face coloured. Gilding, too, was used for the hair. Colour was extensively used in the middle ages. Many, if not most, interior sculptures were coloured during that period. Quite in our own days Mr Gibson has coloured female statues. It is open to doubt whether they can be called successful as far as the colour goes. Other means, however, were used to give colour in late classic times, as may be seen in the Vatican, where a bust retains both enamelled eyes and black eyelashes inserted into the marble. To the mixture of marbles to obtain the effect of colour we have already alluded.

Speaking of sculpture generally, we may say that a great deal has come down to us. Of the best work known, that of Phidias, our readers will see notices under the head of the Elgin Marbles. The majority of portable works are statues. Of these, some calculations reckon as many as 60,000 of one kind and another.

Fragments of these have various terms applied to them. 'Busts' are heads, or heads and chests; a 'torso' is a figure without head or limbs. These are perhaps fragments. Horace, however, is supposed to allude to a recognised form of such pieces of sculpture in the words 'mediam minervam.' Statues are called 'terminal' when they consist of a head only made out, the body being represented by a square post. These were set up as boundary marks, to invoke favourite deities for the owner's prosperity, and hence the name 'terminal.'

We now proceed to a very summary survey of the history of sculpture. We have said that ancient nations, both of profane and sacred history, were well used to sculpture. Of these, the Egyptian and the Ninevite are best known. The Egyptian sculpture goes back as far as 1700, or even, in the case of the Pyramids, to 2000 years before Christ (Gardner Wilkinson, *Ancient Egyptians*). Both sculptured the human form, the Egyptians with

most knowledge and refinement; both were restricted by religious traditions from arriving at a full representation of the human form; both used mixed forms of man-headed bulls, or man-headed and ram-headed lions. Usually these were colossal. The Egyptians, besides this, covered the walls of their sepulchres and temples with spirited and amply detailed historical representations.

The next great nation of whose productions we can judge was the Etruscan. They were of Greek origin. There is a great oriental influence or character in their work. It is also to some extent conventional, but often full of sublimity, and the figure quite correct in outline. This also is illustrated by their pottery, covered with figure designs, of which great abundance has been excavated in various parts of Italy. All these schools, including the Etruscan, are stiff and dry in execution—that is, wanting in the ease, fulness, and movement of the human form. They are called 'archaic,' meaning by that term unformed and undeveloped, belonging to an age uninstructed in technical knowledge.

Beginning with the early Egyptian times, this first period, called Archaic, may be concluded with those of the Etruscans, and brings us down to about 600 B.C. From this time a rapid growth in the art took place; schools were formed in the great cities of Greece, Sicyon, Egina, and Corinth; and we read of Callon, Onatas, Glaucias, and other names, culminating in Ageladas of Argos. These men sculptured on a colossal scale, and we have already alluded to the bronze for which the Greek cities had long been famous. These schools produced the famous works known as the Egina Marbles, found in 1812, as well as those of Selinus, in Sicily. Casts of the former may be seen in the British Museum. The originals are at Munich.

The great period of sculpture began about 484, when Phidias was born. Ageladas was his master, as also of Polycletus and Myron, of whose works copies are now in the Vatican and elsewhere, made by Greek artists in the times of the Roman empire.

Of the great work of Phidias we will not here treat, as it is described elsewhere. Pericles did much to encourage the arts both of sculpture and painting.

For a century and a half, or for vo, sculpture continued very slowly to decline. This gre.t school ended in Praxiteles, a sculptor of consummate powers. He carried the representation of the human form further than Phidias and his scholars, and draperies in his hands lost their severer character, and clung to the rounded limbs, which they no longer concealed. His work may be seen in the casts of the Nike Apteros, or sculptures of the temple of unwinged Victory, in the British and other museums. He is said to have been the first to represent the female form quite nude, and to have contributed by such sculptures to the enervation and gradual sensualising of the art.

During the 5th and 4th centuries B.C., we have Agoracritos of Paros; Alcamenes of Athens; Scopas, the author of the famous Niobe group now at Florence; Lysippus of Sicyon, the favourite of Alexander; Chares, the author of the famous Colossus of Rhodes; Agasias, who sculptured the 'Fighting Gladiator;' Glycon of the Farnese Hercules; and many others.

The Roman conquest of Corinth under Mummius in the 2d c., and afterwards of Athens, brought this old art to an end. Thenceforth. Greek artists were found all over the Roman empire, and the famous works of these former sculptors were reproduced by them for their new masters. The Roman sculpture, indeed, is included in this phase of Greek art—the last remarkable work that we shall notice of classic times being the famous column of Trajan, in the early part of the 2d c. A.D. This is, in fact, a tower over 100 feet high, of white marble, entirely covered with bas-reliefs representing the Dacian wars of Trajan. We here see the expiring effort of classic art. Skilful and correct as the design is, it is, as a whole, graceless, stiff, and without beauty, compared with the old work.

Constantine, in the 4th c. of our era, carried off to Byzantium, his new seat of government, all the sculpture he could remove.

The art revived in Italy. As early as the 10th c., sculpture exhibited both design and grandeur, though wholly different from that of older times. Absolute freedom from old conventionalities, vigour, dignity, and childlike freshness of mind, distinguishes modern sculpture down to the 15th century. The most noted names we will mention here are those of Niccolo of Pisa, in the 13th c., who executed the bas-reliefs at Orvieto; after him, his son Giovanni. Andrea Pisano made one of the bronze gates of the baptistery of Florence. Ghiberti, the author of the more famous doors of the same baptistery, is next to be named; then Donato di Betto Bardi, or Donatello. Some of his works are in the church of Or san Michele, which the famous Orcagna, sculptor, painter, and architect, had built and decorated.

We begin the next period with Verocchio, in the 15th c., and the more famous Michael Angelo in the 16th. A host of great names followed: Cellini, Torregiano (who made the monument of Henry VII. at Westminster), Della Porta, Giovanni di Bologna, and Luca del'a Robbia, who also worked in enamelled terra-cotta on a large scale. These are Italian names. We may add Jean Goujon and Germain Pilon in France. In our own country, splendid medieval works are to be seen in the noble sculptures of Wells' Cathedral, and of that of Lincoln, coeval with those of the Pisani. Cibber, who sculptured in England, was a Dane. Thorwaldsen, a native of Iceland; Canova, an Italian; and, lastly, Flaxman, bring us down to our own days. Of the latter, the finest work is perhaps the Wellington Shield, after the Homeric description of that of Achilles. See the works of Winckelmann, and Kugler, and Westmacott's *Handbook of Sculpture.*

SCULPTURED STONES. In Norway, Denmark, the Isle of Man, Wales, Ireland, and Scotland, a class of monuments is to be found decorated with rude sculpture, and belonging to the early periods of Christianity—sometimes, indeed, shewing the symbols of paganism in conjunction with those of Christianity. By far the most remarkable stones of this description are those found in Scotland, which, with some points common to them with the rest, possess the distinguishing feature of a class of characters or symbols of mysterious origin, whose meaning yet remains an enigma to antiquaries, and which yet recur with such constancy in different combinations, that it is impossible to suppose their form to be the work of chance. Along with these symbols the figure of the cross is often found on one side. Neither in Ireland, in Wales, nor anywhere else, are the symbols in question to be met with. These monuments all occur within a circumscribed part of Scotland. None are to be found either within the ancient Dalriada, or south of the Forth; their limit seems to be the eastern lowlands from Dunrobin to Largo Law, or the part of Scotland inhabited by the Pictish race. From 150 to 200 of them are known to exist. The most interesting as well as the most numerous specimens are in Strathmore, at Glammis, Meigle, and Aberlemno. Among the various theories which have been formed regarding these stones,

one is, that they were boundary stones, the cross denoting the possession of the church, and the mysterious figures having reference to the lay lord; but those antiquaries who have devoted most attention to the subject, including Mr John Stuart, have come to the conclusion that they are sepulchral. The practice of erecting stones to commemorate deceased persons of note, existed in Scotland in pagan times, and, like other pagan practices, it was turned to Christian purposes by the earliest preachers of Christianity. Most of these monuments are of unhewn stone, and more or less oblong in shape; a very few have the form of a cross. A sculptured cross is met with on about half of them, the class without crosses belonging chiefly to Aberdeenshire, though a few of them are to be found in the country north of Spey. Among the symbols to which we have alluded, one of the most frequent, which has been likened to the letter Z, consists of a diagonal line, from whose extremities are drawn two parallel lines terminating in some sort of ornament. This Z symbol is often

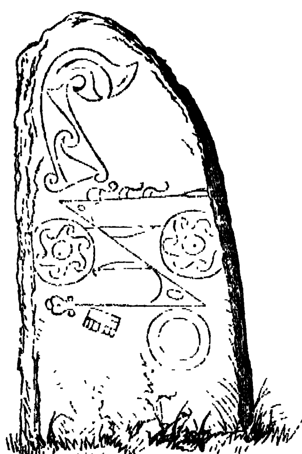


Fig. 1.—Dunnichen Stone.

traversed with what has been called the *spectacle ornament*, consisting of two circles decorated within with foliated lines, and united by two reversed curves, or occasionally intertwined with a serpent. Another prevalent symbol is a crescent, sometimes appearing by itself, more frequently with two lines drawn through it, diverging diagonally from a point below its centre, and terminating in a floral or other ornament. A mirror and comb, a horse-shoe arch, a fish, and a figure like a fibula, are also all occasionally met with. Similar devices to the above have been found engraved on certain silver ornaments discovered on Norrie's Law, including a figure occurring on the Dunnichen Stone, which had been taken by ingenious theorists for the high cap of the Egyptian Osiris, surmounted by a lotus, but which, as engraved on one of those silver relics, appears to be the head of a dog or some other animal.

The earlier of the Scottish sculptured stones, such as the Maiden Stone in Aberdeenshire, and the older of the stones at Aberlemno, have no sculptures except of the class above described; the later combine these with devices of a more intelligible kind. An elephant is not unfrequent, represented in such a fashion, that it is obvious that the artist could never have seen one; and fabulous and grotesque figures abound, often drawn with considerable spirit. We have centaurs, lions, leopards, deer, beasts of chase, men shooting with a bow and arrow, men devoured by animals, processions with men and oxen, and priests in their robes with books. Many of

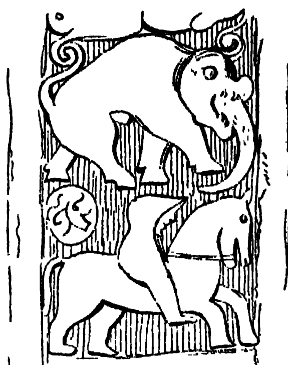


Fig. 2.—Part of Sculptured Stone—Island of Ellanmore, Argyleshire.

these figures are highly interesting illustrations of the manners, customs, and dress of the period. On a stone near Glammis is a man with a crocodile's head. On the cross at St Vigeans, a hybrid, half-bird half-beast, appears in the midst of a border of entwining snakes and fantastic creatures. A stone of great interest at Meigle contains a representation of a chariot. At Farnell is a group of figures that seems to be meant for the temptation. In but two instances have inscriptions been known to accompany these sculptures; in the one case the letters are so worn away as to be undecipherable; in the other instance, at St Vigeans, a few letters can be traced of the same Celtic character which has been found on the earliest Irish monuments and the oldest tombs at Iona.

The general style of ornamentation of these stones, judging by a comparison with Anglo-Saxon illuminated MSS., has led to the conclusion that they were erected in the 8th or 9th c., a period when Christianity had but lately supplanted paganism among the Scottish Picts.

A stone differing in character from those described, now erected near the House of Newton in Aberdeenshire, in the same neighbourhood in which it was found, has been a notable puzzle to archæologists. It is not sculptured, but inscribed in a character which seems unique. Besides the principal inscription, there is another running along the edge, consisting of groups of short lines, and apparently in the Ogham (q. v.) character.

The crosses in Ireland are the likest to these Scottish monuments. They are chiefly found near churches and graveyards, and are generally cruciform, with a halo or circle binding the arms and stem together. They usually taper to the top, on which a conical capstone is fixed, and they are inserted in pedestals of stone, which are frequently covered with sculpture. Most of their subjects are from Scripture history, without anything like the Scotch symbols.

The Welsh crosses are, for the most part, in the form of a small cross within a circle, set on the top of a long shaft, the latter having at times interlaced ornaments in compartments. Many of them have inscriptions in the Romano-British character, relating to the persons in memory of whom they were erected.

The sculptured crosses of Scandinavia and Man somewhat resemble the Scotch monuments in their

general style of ornamentation, though altogether destitute of the peculiar Scottish symbols. On some of them are Runic inscriptions. One inscription on a Manx cross indicates that Gaut (probably a Norwegian) made this cross and all on Man. Another is to the effect that ——— erected this cross to his father Ufag, but Gaut Bjornson made it. Professor Munch, from the character of the Runes on these crosses, assigns them for date the middle or end of the 11th century. See RUNES.

A hundred and fifty of the sculptured stones of Scotland have been carefully engraved and described in a very valuable work contributed to the Spalding Club by Mr John Stuart. Some of those belonging to the county of Angus had been previously illustrated by the late Mr Chalmers of Auldbar, in a volume forming one of the Bannatyne Club series.

SCUPPERS are holes, lined with lead, in a ship's side, intended to carry off rain or other water which may be shipped.

SCURVY, or **SCORBUTUS**, is a disease which is characterised by a depraved condition of the blood. In consequence of this morbid state of the blood, there is great debility of the system at large, with a tendency to congestion, hæmorrhage, &c., in various parts of the body, and especially in the gums. It is a disease that has probably existed from the earliest times, but the first distinct account of it is contained in the history of the crusade of Louis IX., in the 13th c., against the Saracens of Egypt, during which the French army suffered greatly from it. In the 16th c. it prevailed endemically in various parts of the north of Europe, and it seems only to have abated about a century ago. It was in badly-fed armies, in besieged cities, and on board ship, that its ravages were most appalling, and it is believed that more seamen perished from scurvy alone than from all other causes combined, whether sickness, tempest, or battle. Whole crews were prostrated by this scourge, as in the well-known case of Lord Anson's memorable voyage.

Scurvy so closely resembles purpura in its general symptoms that it will be sufficient for us to refer to the article on that disease, and here merely to indicate the leading points of difference between the two diseases, which, notwithstanding their similarity, are essentially different. Scurvy is caused by a privation, for a considerable time, of fresh succulent vegetables, while purpura often makes its appearance when there has been no deficiency of this food, or special abstinence from it. Scurvy is most common in winter or the early spring, while summer and autumn are the seasons for purpura. In scurvy the gums are invariably swelled and spongy, and bleed readily; in purpura this is not necessarily the case. In scurvy there is extreme debility and depression of spirits, venesection and mercury do positive harm, while a cure is rapidly effected by the administration of lemon-juice, or of fresh fruits and vegetables; whereas in purpura there is little or no mental or bodily depression, venesection and mercury often give relief, while no marked and certain relief follows the administration of the lemon-juice and fruits that are all powerful in scurvy.

Although the virtues of lemon-juice in scurvy were known in this country as far back as 1636, when John Woodhall, Master in Surgery, published *The Surgeon's Mate, or Military and Domestic Medicine*, this invaluable medicine was not made an essential element of nautical diet till 1795. The effect of this official act may be estimated from the following numbers. In 1780 the number of cases of scurvy received into Haslar Hospital (a purely naval hospital) was 1457, while in 1806 there was only one case, and in 1807 only one case. Many naval surgeons of the present day have never seen a case of the disease. The potato possesses almost equally great antiscorbutic properties, and, fortunately, potatoes when cooked are as active as when taken raw. The late Dr Baly, to whom we are indebted for this discovery, states that 'in several prisons the occurrence of scurvy has wholly ceased on the addition of a few pounds of potatoes being made to the weekly dietary.' The salutary action of potatoes is probably owing to their containing a considerable amount of tartaric acid, partly in combination with potash and lime, and partly free. In addition to the dietetic treatment, which should include easily-digested animal food, potatoes, such ripe fruits as can be procured, and an abundance of lemonade, little further need be prescribed. If necessary, constipation must be relieved by mild laxatives, such as rhubarb and castor-oil; the appetite may be stimulated by bitter tonics, and opiates given to procure rest in cases of pain or obstinate wakefulness. When the gums are very troublesome, solutions of tannin, chloride of lime, or of nitrate of silver, may be applied to them. For an excellent account of this disease, the reader is referred to the article 'Scurvy' by Dr Budd, in *The Library of Practical Medicine.*

SCURVY-GRASS (*Cochlearia*), a genus of plants of the natural order *Cruciferæ*, having small white flowers, and turgid many-seeded pouches; the cotyledons accumbent. The species are annual or biennial, rarely perennial plants; of humble growth, with branched smooth stems, smooth simple leaves, and terminal racemes of flowers. They have an acrid biting taste, containing the same pungent volatile oil which is found in Horse-radish, and are valued for their antiscorbutic properties. COMMON S. (*C. officinalis*) is sometimes a foot high; the root-leaves are stalked and heart-shaped; the pouches globose, ovate, or elliptical. It is a variable plant, and some of the other species described by botanists are probably not essentially different. They possess the same properties. S. is very common on the shores of Britain, growing both on rocks where there is little soil, and in muddy places. It is also found on high mountains. It is a very widely-distributed plant, and being found on the shores of almost all parts of the world, has often been of the greatest benefit to sailors, in times when the modern precautions against sea scurvy were unknown.

SCUTAGE, or **ESCUAGE** (Lat. *scutum*, shield), a pecuniary fine or tax sometimes levied by the crown, in feudal times, as a substitute for the personal service of the vassal. No scutage seems at any time to have been levied in Scotland.

SCUTARI (Italian or Levantine form of the Turkish *Uskúdar*), a town of Asiatic Turkey, on the eastern shore of the Bosporus, immediately opposite Constantinople, of which it may be considered a suburb. It is built on the sides and summit of a hill, sloping irregularly upwards from the water's edge, and bears, both externally and internally, a great resemblance to the Turkish capital. It contains several mosques, bazaars, and baths, a college of howling dervishes, manufactories of silks and cotton fabrics, corn warehouses, and *imarets* or kitchens for the poor. It has long been famed for its extensive cemeteries, adorned with magnificent cypresses, the chosen resting-place of many of the Turks of Constantinople, from attachment to the sacred soil of Asia, and the traditionary belief that their race will one day be driven out of Europe. The population is variously estimated at from 40,000 to 60,000, or even 100,000. S. has

of late years acquired great notoriety in connection with the English army during the Russian War (1854—1856), when the enormous barracks built by Sultan Mahmud, on the southern outskirts of the town, were occupied as barracks and hospital by the English troops, and formed the scene of Miss Nightingale's labours. A little to the south of the General Hospital, on the cliffs bordering the Sea of Marmora, is the densely-filled English burial-ground, where Baron Marochetti's monument in honour of the troops has lately been erected.—S. is a place of considerable traffic, and is the rendezvous and starting-point of caravans and travellers trading with the interior of Asia. It occupies the site of the ancient *Chrysopolis;* and about two miles to the south, lies the village of Kadikoi, the ancient *Chalcedon.*

SCUTARI (Turkish *Iskandere*, the anc. *Scodra*), a considerable town of European Turkey, in Northern Albania, capital of a sanjak of the same name, situated at the southern end of the Lake of Scutari, at the point where the Bojana, issuing from it, is joined by the Drinassi. The lake is about 20 miles long, and abounds in fish. S. is a fortified town, with a citadel on a commanding height. It has manufactories of arms and cotton goods, a bazaar, and yards for building coasting-vessels. It carries on a considerable trade. The population is estimated at about 40,000, of whom about one half are Roman Catholics.

SCU'TCHEON, in Carpentry, is the small metal plate used to form the protection and ornament to the keyhole for locks; it is usually of brass, but in ornamental cabinet-work, is often of ivory, mother of pearl, &c. See SHIELD.

SCY'LLA AND CHARY'BDIS. Scylla (Gr. *Skullaion*), a rocky cape on the west coast of South Italy, jutting out boldly into the sea so as to form a small peninsula just at the northern entrance to the Straits of Messina. About the beginning of the 5th c. (B.C.), a fort was built upon the rock (which is about 200 feet high, and much hollowed out below by the action of the waves), and in course of time a small town grew up, straggling down the slopes towards the sea. The navigation at this place was looked upon by the ancients as attended with immense danger, which, however, seems to have been much exaggerated, for at the present day the risk is not more than attends the doubling of any ordinary cape. The rock, according to the Homeric legend, was the abode of a monster called Scylla, possessing 12 feet, 6 long necks and mouths, each with three rows of sharp teeth, and who barked like a dog. There are other accounts of Scylla, one of which represents her as having once been a beautiful maiden, beloved by the sea-god Glaucus, but who, by the jealousy of Circé, was changed into a monster having the upper part of the body that of a woman, while the lower part consisted of the tail of a fish or serpent surrounded by dogs. The modern Scilla or Sciglio is a fortified town in the province of Reggio-Calabria, having large silk-works, the pop. being upwards of 7400, mostly seafaring people.

Charybdis (modern name *Calofaro*), is a celebrated whirlpool in the Straits of Messina, nearly opposite the entrance to the harbour of Messina in Sicily, and in ancient writings always mentioned in conjunction with Scylla. The navigation of this whirlpool is, even at the present day, considered to be very dangerous, and must have been exceedingly so to the open ships of the ancients. A modern writer describes it as being 'an agitated water of from 70 to 90 fathoms in depth, circling in quick eddies.' Homer places it immediately opposite to Scylla, probably taking advantage of the poetic licence to exaggerate the danger of the navigation, although it is not improbable that the whirlpool may have changed its situation since his days. The myth connected with it is, that under a large fig-tree, which grew out of a rock opposite Scylla, dwelt the monster Charybdis, who thrice every day sucked down the water of the sea, and thrice threw it up again.

SCYTHE. See REAPING.

SCY'THIA, a name employed in ancient times to denote a vast, indefinite, and almost unknown territory north and east of the Black Sea, the Caspian, and the Sea of Aral. But the term is not so much *geographical* as *ethnological*, and the only interest attaching to the barren catalogue of tribes and nations, which we meet with in the classical writers, springs from the hope of connecting these with a recognised race of modern times. Latham argues—successfully, as it appears to us—for the Scythians being the ancestors of the later *Turks*, and maintains their central and primitive abode to have been Independent Tartary, whence they spread west round the Caspian into Russia, Transylvania, and perhaps even Eastern Hungary. Niebühr and Neumann favour the hypothesis of a Mongol origin for the Scythians; while others regard them as Finns or Circassians. In their mode of life they were mainly nomadic and pastoral, though we read of some trans-Danubian and Euxine tribes that followed agriculture. Many of them were *Hippemolgi* ('mare-milkers').

SEA, in its general signification, denotes that large expanse of salt water which covers the more depressed portion of the earth's surface, fills up each hollow and rift to a certain uniform level, completing as far as possible the spheroidicity of the globe, and divides its surface into two great and innumerable smaller portions—the Old and New Worlds and their islands. This immense body of water is not distributed with the least approach to regularity, but here forms a huge basin, there becomes a long and tortuous inlet or strait, which narrows or widens as the configuration of the land-surface on each side permits; nor is it placed symmetrically to the earth's axis of rotation; for the hemisphere of which the south-west corner of England is the centre or pole contains the whole of the land-surface, if we except the triangular portion of South America, south of Uruguay, Australia, New Zealand, the most of the East Indian Islands, and the land around the south pole (of unknown extent). The other hemisphere is, with these exceptions, wholly water. From this irregular distribution of the sea over the earth's surface, and from the specific gravity of water being about $\frac{1}{5}$th of that of the land, it necessarily follows that the centre of gravity of the whole globe does not correspond accurately with its centre of figure. The extent of sea-surface is estimated at 146,000,000 English sq. m., or nearly $\frac{3}{4}$ths of the whole of the earth's surface, and its mass, on the supposition of an average depth of $4\frac{1}{2}$ miles, is more than $\frac{1}{1500}$th of that of the whole globe; such estimates, however, can be considered at best as only rough approximations. One of the most remarkable features of the sea is its continuity or oneness; for in spite of the fact, that numerous large stretches of salt-water, as the Sea of Azof, Black, Mediterranean, and Baltic Seas, the Gulf of Mexico, and others, have barely avoided becoming detached lakes, very few such are found on the earth's surface; and with the exception of the Caspian and Aral Seas, they are of small size.

Composition, Specific Gravity, and Temperature of

the Sea.—The sea consists of salt water, and from its continual motion, under the influence of currents and waves, preserves, generally speaking, uniform saltness. Under special circumstances, however, we find the saltness increased, as by the excess of evaporation over the fresh-water influx in the Mediterranean and Red Seas, and about the northern and southern limits of the tropical belt; and decreased, by the contrary cause, in the Sea of Azof, Black Sea, Baltic Sea, and in the polar regions. See TRADE-WINDS. The origin of the saltness of the sea is sufficiently accounted for when we consider, that the chloride of sodium and other soluble salts which form constituent ingredients of the globe, are being constantly washed out of the soil and rocks by rain and springs, and carried down by the rivers; and as the evaporation which feeds the rivers carries none of the dissolved matter back to the land, the tendency is to accumulate in the sea. The principal ingredients found in sea-water are chloride of sodium, or common salt, together with salts of magnesia and lime. A more exact analysis will be given under WATER. The average specific gravity of the sea, out of reach of the exceptional action of the melting of snow, rain or river water, is (at 62° F.) 1·0272. The slight variations in the saltness of the sea must necessarily produce corresponding changes in its specific gravity; accordingly, on the northern and southern limits of the torrid zone, the mean specific gravity of the sea is, in different longitudes, 1·0281, 1·0294; while at the equatorial calm belt, it is 1·0272, 1·0279; and on the whole shews a tendency to diminish as the latitude increases, Beechey having found it to be 1·0258 in lats. 55°—60° N. and S. in the Pacific, and King 1·0255 in the corresponding latitudes of the Atlantic. It also increases with the depth below the surface, though not at a regular rate; is considerably diminished by rains at and near the mouths of rivers, and in those inlets or semi-lacustrine arms which are the depositories of more river-water than compensates for their evaporation, as in the Black Sea, where it is only 1·0141. A few springs of fresh water are found in the sea, but their effect in diluting its saltn · is nfinitesimal.

The temperature of the sea, where it is not affected by currents from a warmer or colder region, necessarily corresponds to that of the air above it; but this is true only of the water at and near the surface, for it has been found, that beyond a certain limit of depth, the temperature is constant at 39° to 39·5° F. This depth, however, is not the same at all latitudes, but appears to vary in a similar manner to the perpetual snow-line on land—being about 1⅘ths miles under the equator, thence gradually rising to the surface, which it reaches (in the southern hemisphere) in lat. 56° 25′, and in the northern hemisphere in lat. 48° 20′–67° 30′, the limits of the isotherm of 39°—39° 5′, and descending as the latitude increases to ⅘ths of a mile about lat. 70°. From the equator to the isotherm of 39°, the water above this line is warmer, and between this latitude and the pole is colder than it is below the line, the temperature gradually, though not uniformly, varying from the line to the surface. Of course, in a few lo alities where exceptional causes are at work, as in the case of the sea between Corunna and Ferrol, as found by Humboldt, violations of this rule may occur, but these are comparatively few in number. The line of greatest surface-temperature does not correspond to the equator, but, owing to the disturbing influence of currents, is found in lat. 10° N. in the Atlantic (28° N. in the Gulf of Mexico), lat. 12° N. in the Indian Ocean, and lat. 8° S. in the Pacific. See ISOTHERMAL LINES. The temperature of the surface on sea is far less variable than it is found to be on land, and there exist extensive tracts, especially in the North Atlantic and North Indian Oceans, where it is almost equable.

Colour and Phosphorescence of the Sea.—The colour of the ocean, when free from admixture of foreign substances, as animalcules, vegetable organisms, excessive rain, or the tinted waters of swollen rivers, is a pure deep blue, which becomes less marked where the water is of less depth. The origin of this colour is sought in the fact, that the blue rays of the spectrum are less liable to be absorbed by masses of transparent fluid than are the others, and thus predominating in the reflected pencil, they make most impression on the eye. This hypothesis is certainly supported by the numerous instances in which it has been well ascertained that a 'different' colour of sea-water is due to the presence of some foreign substance, e. g., the red, brown, and white patches of the Pacific and Indian Oceans, to the presence of swarms of animalcules, and the colours of the Red and Yellow Seas, to matters of vegetable origin. However, some fresh-water lakes exhibit the same phenomenon, while others, for no ascertained reason, do not; and the Rhone, at its emergence from the lake of Geneva, exhibits an intensity of blue far surpassing that of any sea. The probability is that we have only got hold of a part of the explanation. The phosphorescence of the sea is due to the presence of myriads of invertebrata, especially rhizopoda, tunicata, &c. See LUMINOSITY OF ORGANIC BODIES.

Depth of the Sea.—Till very recently, it might be said that, with the exception of the more frequented strips along the coast, and such other portions as afforded anchorage-ground, our knowledge of the depth of the ocean amounted to nothing. It is true that deep-sea soundings had been frequently made, but from the necessary defectiveness of the ordinary 'lead,' and inattention to the effect of under-currents in destroying the perpendicularity of the line, little dependence could be placed on the results obtained. Even at the present time, our knowledge is confined chiefly to the North Atlantic, the greatest depth of which, as far as it has (according to Maury's opinion) been satisfactorily ascertained, is 25,000 feet, though there are, in all probability, considerably greater depths in the region between the United States, the Bermudas, and Newfoundland. Soundings giving a depth of 2½ and of more than 3 miles were made by Lieutenant Brooke in the Pacific, and this result corresponded very nearly with the estimate of its average depth drawn by Professor Bache from observation of the time taken by the great tide-waves of December 23, 1854, originated by the terrible earthquake which occurred in Japan on that day, to traverse the ocean between Japan and California; the latter giving an average depth of 2365 fathoms, or 2⅔ miles. From the numerous islands which stud this ocean, one would be led at first sight to assume its comparative shallowness; but the abruptness with which they rise above the surface, and the remarkable soundings which have been obtained near their shores, completely annihilate this supposition. In the Indian Ocean, Brooke made a sounding of about 8 miles, but Maury (who strenuously opposes the old belief in the great depth of the sea) throws great doubt on the correctness of this result. From the remarkable gentleness of slope of the bed of the Arctic Ocean to the north of Siberia, the line giving only 14—15 fathoms at 150 miles from the shore, and from its configuration on the north of America, it is generally concluded to be by far the shallowest of the oceans, but no one

has hitherto ventured to give a deliberate estimate of its depth. Of the depth of the Antarctic Ocean, nothing is *known*, but it is supposed to be deeper than its antipodal kinsman. Till our chart of soundings be tolerably complete, it will be impossible to give any general idea of the conformation of the bed of the sea, but, judging from what has been lately discovered concerning the North Atlantic (q. v.), it would seem as if the land-surface under water were the counterpart as regards eminences and hollows, chasms, valleys, plateaus, &c., of the land-surface above.

Motion of the Sea.—The sea is in a state of perpetual restlessness, its motion being either a vertical oscillation, or an actual transference of its waters from one place to another. The first motion, which constitutes *waves*, is due either to the attraction of the sun and moon on such a mobile body as the sea (see TIDES), or to the impulsive action of the winds which blow over its surface (see WAVES); the second arises from the sun, which, directly through its heat, and indirectly by scorching dry winds, produces evaporation to a great extent, of the parts most exposed to its influence, and by its similar action on the atmosphere (see TRADE-WINDS), causes a transference of this vapour to remote latitudes, where it descends as rain, and, destroying the equilibrium of the sea, gives rise to *currents*. The nature of these currents is described under GULF STREAM, and the chief currents of each ocean are found under its own head. This constant motion of the sea is of great service in tending to equalise the temperature of different parts of the globe; it also produces remarkable changes in the form of coasts, eating into rocks, converting low-lying lands into shoals and sand-banks, or carrying away the earthy materials, and depositing them in some distant region. The erosive action of the sea is generally almost imperceptible during several years, but in course of two or three centuries, the magnitude of the changes effected by it is almost incredible.

The sea, like the land, teems with animal life; representatives of the four great divisions of the animal kingdom are found abundantly, and though its temperature is far more equable, the limitation of the zonal range of animals is not a whit less definite: the profound depths of ocean would appear to be as barren of vegetable and animal life as are the lofty summits on land; and the inhabitants of the deep seem to suffer as much from being taken even a little out of their depth, as would a land animal removed to an unaccustomed altitude.

On the economic value of the sea as a purifier, and as a commercial highway, it is unnecessary to dilate. For some of the peculiar phenomena of the sea, see ICEBERGS, AURORA BOREALIS, WHIRLPOOLS, the five great OCEANS (q. v.), CORAL, &c.

The term *Sea* is also applied in a more limited though indefinite sense, to an offshoot of one of the oceans, as to the Black, Baltic, Okhotsk Seas, to any portion of an ocean which from its position or configuration is considered deserving of a special name, and to the two great inland salt lakes of Central Asia, the Caspian and Aral Seas.

SEA, SOVEREIGNTY OF THE. Blackstone lays it down that the main or high seas are part of the realm of England, as the Courts of Admiralty have jurisdiction there; but adds that they are not subject to common law. But the law of nations, as now understood, recognises no dominion in any one nation over the high seas, which are the highway of all nations, and governed by the public law of the civilised world. Such a right has, however, long been claimed over the four seas surrounding the British Isles. It was strongly asserted by Selden, and denied by Grotius, and measures were taken to vindicate the right in the reign of Charles I. Every nation has undoubtedly a right to the exclusive dominion of the sea within a certain not very well-defined distance from the shore, depending on the usage of the country. This right of lordship includes the right to free navigation, to fishing, to taking wrecks, the forbidding passage to enemies, the right of flag, of jurisdiction, &c. By the law of England, the main sea begins at low-water mark; and between low and high-water mark the common law and admiralty have a divided jurisdiction, one on land when left dry, the other on the water when it is full sea. By the law of Scotland, the sea-shore is not considered to extend beyond the point which the sea reaches in ordinary tides. See BLOCKADE, NEUTRALS.

SEA CUCUMBER. See HOLOTHURIA.

SEA GRAPE (*Ephedra*), a genus of plants of the natural order *Gnetaceæ*, a natural order consisting of a small number of species, closely allied in botanical characters to the *Coniferæ*, and by many botanists united with that order, although differing much in appearance. The *Gnetaceæ* are small trees, or twiggy shrubs, with opposite or clustered branches and jointed stems, whence they are sometimes called JOINT-FIRS. They secrete not resinous but watery matter. The development of the ovule is very peculiar; it has a projecting process formed from the intimate covering of the nucleus.

SEAHAM HARBOUR, a thriving seaport in the county of Durham, 6 miles south of Sunderland. Its excellent harbour is furnished with wharfs, quays, and jetties, and the town contains most extensive bottle-works, blast furnaces, iron-foundry, and chemical works. It communicates by railway with collieries in the vicinity, and the principal articles of export are coals and agricultural produce. The town has nearly doubled its population during the last ten years. Pop. (1851) 3538, (1861) 6137, (1865) 7000.

SEA-HORSE, in Heraldry, a fabulous animal, consisting of the upper part of a horse with webbed feet, united to the tail of a fish. A scalloped fin is carried down the back. The arms of the town of Cambridge are supported by two sea-horses, proper finned and maned or.


Sea-horse.

SEA-KALE (*Crambe maritima;* see CRAMBE), a perennial plant with large roundish sinuated sea-green leaves, found on the sea-shores in various parts of Europe, and in Britain. The blanched sprouts have become a very favourite esculent in Britain, although as yet little known on the continent. The common people, on some of the shores of England, had long been in the practice of watching them when they came through the sand, and using them as a pot-herb, but the cultivation of the plant in the kitchen garden became general only at a comparatively recent date. It requires a deep rich soil, and the care of the gardener is bestowed upon the blanching, without which the sprouts are not tender and agreeable, but even acrid. The blanching is accomplished in various ways, by earth, sand, boards, earthenware pots, &c. Sea-kale is generally raised from seed, although also sometimes propagated by offsets or by cuttings of the roots. The seedlings do not yield a crop till the third year; but a plantation of sea-kale remains productive for many years.

It is planted in rows, four to six feet apart. It sends its tap-root very deep into the ground.

SEAL (Lat. *sigillum*, Fr. *sceau*), an impression on wax or other soft substance made from a die or matrix of metal, a gem, or some other material. The stamp which yields the impression is sometimes itself called the seal. In Egypt, seals were in use at an early period, the matrix generally forming part of a ring (see GEM, RING). Devices of a variety of sorts were in use at Rome, both by the earlier emperors and private individuals. The emperors, after the time of Constantine, introduced *bullæ* or leaden seals, and their use was continued after the fall of the Western Empire by the popes, who attached them to documents by cords or bands. On the earlier papal seals are monograms of the pope; afterwards the great seal contained the name of the pope in full, and a cross between the heads of St Peter and St Paul, while the papal privy seal, impressed not on lead but on wax, known as the *Seal of the Fisherman*, represented St Peter fishing. In the 9th and 10th centuries we find Charlemagne, the Byzantine emperors, and the Venetian doges, occasionally sealing with gold, and we have an instance as late as the 16th c. of a gold seal appended to the treaty of the Field of the Cloth of Gold, between Henry VIII. and Francis I.

Seals were not much used in England in Anglo-Saxon times, but they came into general use after the Norman Conquest. On the royal great seals was the king in armour on a caparisoned horse galloping, his arms being shewn on his shield after the period when arms came into use; and the reverse represented the king seated on a throne. The great seals of Scotland begin with Duncan II.




Great Seal of William the Conqueror.

in the end of the 11th c., and have also the subject the king on horseback; the counterseal, with the seated figure, being used first by Alexander I., and the earliest appearance of the arms of Scotland being on the seal of Alexander II. In both countries there were also the privy seals with the royal arms only.

Ecclesiastical seals first appear in the 9th c., and attained great beauty in the 13th and 14th. They are of the pointed oval form known as *Vesica piscis;* and have for subjects, a figure of the bishop, sometimes of the Trinity, the Virgin, or a patron saint, seated under an elaborate architectural canopy. The arms of the bishop are often added.

Under the Norman monarchs of England, sealing became a legal formality, necessary to the authentication of a deed; and from the 13th c. onwards, the seals of all persons of noble or gentle birth represented their armorial ensigns. The seal was generally appended to the document by passing a strip of parchment or a cord through a slit in its lower edge; and the ends being held together, the wax was pressed or moulded round them a short distance from the extremity, and the matrix impressed on it. Occasionally the seal was not pendant, but the wax was spread on the deed. The coloured wax with the impression was sometimes imbedded in a mass of white wax forming a protective border to it. In England, a seal is still an essential to all legal instruments by which real estate is conveyed; but since subscription has also become necessary, the practice of sealing has degenerated into a mere formality. The custom was gradually introduced of covering the wax with white paper, on which the impression was made, and latterly wafers have been considered a sufficient substitute for seals.

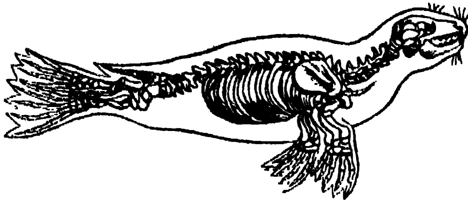
In Scotland, every freeholder was obliged by statutes of Robert III. and James I. to have his seal of arms, an impression of which was kept in the office of the clerk of court of the shire; and among the Scottish armorial seals of the 14th and 15th centuries are some of wonderful beauty of execution. Act 1540, c. 117, for the first time made subscription an essential formality to deeds; but sealing still continued to be necessary till 1584, when it was dispensed with in the case of deeds containing a clause of registration, and soon afterwards the practice was altogether laid aside.

The use of corporate seals by towns and boroughs dates as far back as the 12th century. The earlier corporate seals bear the town gates, city walls, or some similar device; the use of corporate arms did not begin till the latter half of the 14th century.

The principal use of seals in the present day is in closing letters, and even for this purpose they have of late years been less used than formerly, owing to the fashion of using stamped adhesive envelopes.

The study of medieval seals is of great importance and interest in connection with many branches of archæology, including heraldic and genealogical investigation. See GREAT SEAL; PRIVY SEAL.

SEAL (*Phoca*) a Linnæan genus of Mammalia, now forming the family *Phocidæ*, and including all that family except the Morse (q. v.), or Walrus. The name S. is from the Anglo-Saxon *Seol*. The *Phocidæ* constitute, in Cuvier's system, a section of *Carnivora* (q. v.) designated *Amphibia*. Their



Skeleton of Seal, with outline of the figure.

structure is most perfectly adapted to an aquatic life, and they live chiefly in water, but spend part of their time on shore, reposing and basking in the sunshine on rocks, sand-banks, icefields, or beaches; and they bring forth their young on shore. The body is elongated, and tapers from the chest to the tail; the head somewhat resembles that of a dog, and in most of the species the brain is large; the feet are short, and little more than the paw projects beyond the skin of the body; all the feet are thoroughly webbed, and five-toed; the fore-feet are placed like those of other quadrupeds; but the hind-feet are directed backwards, like a prolongation of the body, and between them is a short tail. The toes, particularly those of the hind-feet, are capable of being spread out very widely in swimming, so as to give great propulsive power. The movements of seals in the water are very rapid and graceful; on land, they are very peculiar; even the fore-feet being little used or not at all, but the body contracted by an upward bending of the spine, and so thrown forward by a succession of jerks; in which way, however, a S. makes its escape very rapidly from an assailant. The flexibility of the spine in seals is very remarkable, and depends on the very large intervertebral cartilages, formed of fibrous concentric rings. The muscles, which are connected with the spine on all sides, are of great strength.

The teeth differ considerably in the different genera, but in all are adapted for the seizure of slippery prey, the chief food of seals being fishes, although they do not reject other animal food, and are said even to feed in part on vegetable substances. Their incisors are either six in the upper jaw and four in the lower, or four in the upper and two in the lower; they all have large and strong canine teeth; and the molars, usually five or six on each side in each jaw, are either sharp-edged or conical, and beset with points. Seals have a remarkable habit of swallowing large stones, for which no probable reason has yet been conjectured. Their stomachs are very often found to be in part filled with stones. The stomach is quite simple; the gullet (*œsophagus*) enters it at the left extremity; the cœcum is short, the intestinal canal long.

The respiration of seals is extremely slow, about two minutes intervening between one breath and another, when the animal is on land and in full activity. A S. has been known to remain twenty-five minutes under water. Their slowness of respiration, and power of suspending it for a considerable time, is of great use, as enabling them to pursue their prey under water. The fur of seals is very smooth, and abundantly lubricated with an oily secretion. There is generally an inner coating of rich fur, through which grow long hairs, forming an outer covering. Another adaptation to aquatic life and cold climates appears in a layer of fat immediately under the skin—from which *Seal Oil* is obtained—serving not only for support when food is scarce, but for protection from cold, and at the same time rendering the whole body lighter. The nostrils are capable of being readily and completely closed, and are so whilst the S. is under water; and there is a similar provision for the ears; whilst the eye, which is large, exhibits remarkable peculiarities, supposed to be intended for its adaptation to use both in air and water. The face is provided with strong whiskers, connected at their base with large nerves.

Seals produce their young only once a year; sometimes one, sometimes two, at a birth. Not long after their birth, the young are conducted by the mother into the sea. Many, if not all, of the species are polygamous. Terrible fights occur among the males.

Seals are very much on their guard against the approach of man, where they have been much molested; but where they have been subjected to no molestation, they are far from being shy, and approach very close to boats, or to men on shore, as if animated by curiosity. They are much affected by musical sounds. A flute is said to attract seals to a boat, where they have not learned caution from sore experience; and the ringing of the church bell at Hoy, in Orkney, has very often caused the appearance of numerous seals in the little bay. Seals possess all the five senses in great perfection.

The Common S. and some of the other species are very intelligent; but there is considerable difference in this respect among the species. The Common S. and some others have often been tamed, and are capable of living long in domestication, if freely supplied with water. They become very familiar with those who attend to them, are very fond of caresses and of notice, recognise their name like dogs, and readily learn many little tricks, of which advantage has been taken for exhibitions.

Seals are found in all the colder parts of the world, most abundantly in the arctic and antarctic regions; some of them also in temperate climates, as far south as the Mediterranean, and as far north as the La Plata. Some of them ascend rivers to some distance in pursuit of salmon and other fish. They are found in the Caspian Sea, and even in the fresh-water Lake Baikal.

The species are numerous, but in no group of Mammalia does more remain for further investigation. Seals are divided into two principal groups—*Seals*, more strictly so called, and *Otaries* (q. v.); the former distinguished by the complete want of external ears, which the latter possess, and by their dentition. The true seals have been further subdivided into genera, chiefly characterised by their dentition. In the restricted genus *Phoca*, or *Calocephalus*, the incisors are pointed and sharp-edged, six above and four below. The Common S. (*Phoca vitulina*) is found in the northern parts of the Atlantic Ocean, and in the Arctic Ocean. It is common on the wilder and more unfrequented parts of the British coast, particularly in the north. It is remarkably distinguished, even among its nearest congeners, by the oblique position of the molar teeth. The fur is yellowish, variously spotted, and marked with brown. The whole length is from 3 to 5 feet. Its love of salmon is so great that it has been known to haunt the neighbourhood of a salmon-net for a long time, and to take the fish after they were entrapped in it. The Common S. is generally seen in small herds. Its skin and oil are of considerable mercantile importance. The skin is dressed with the fur on, to make caps, &c., or is

tanned and used as leather. The oil, when made before decay has begun, is colourless and nearly inodorous; it is much superior to whale-oil. The flesh is much used for food in very northern countries, as is that of all the other species which they produce. It is not easy to shoot a seal. Whilst flint-locks were in use, the S. always dived so quickly on seeing the flash as generally to escape the ball. The popular name SEA-CALF, and the specific name *vitulina*, have reference to a supposed resemblance of the voice to that of a calf.—The HARP S. (*P. Grœnlandica*) receives its popular



Harp Seal (*Phoca Grœnlandica*), attitude on land.

name from a large, black, crescent-shaped mark on each side of the back. It is sometimes seen on the British coasts, but belongs chiefly to more northern regions. It is from 6 to 8 or even 9 feet in length. —The GREAT S., or BEARDED S. (*P. barbata*), also found on the British coasts, and plentiful on the coasts of Greenland, is generally about 9 or 10 feet long, sometimes more.—The ROUGH or BRISTLED S. (*P. hispida*) frequents quiet bays on the coasts of Greenland, where many thousands are annually killed for their skins and oil. It is the smallest of the northern species.—The GRAY S. (*Halichœrus griseus*), which has a very flat head, and attains a



Common Seal (*P. vitulina*), attitude when swimming.

size nearly equal to the Great S., occurs on the British coasts, but is much more common in more northern latitudes, and in the Baltic Sea.—The CRESTED S. (*Stemmatopus cristatus*) is remarkable for the elevation of the septum of the nose of the adult male into a crest, which supports a hood covering the head, and capable of being distended and elevated or depressed at pleasure. The use of this appendage is not known. This S. is plentiful on the coasts of Greenland and the northern parts of North America.—The seals of the southern seas are quite distinct from those of the northern. One of them is the SEA LEOPARD, or LEOPARD S. (*Leptonyx Weddellii*), so called from its spotted fur. It is found on the South Orkneys and other very southern islands. By far the largest of all the seals is the ELEPHANT S., or Sea Elephant of the southern seas. See ELEPHANT, SEA.

Seals are to some extent migratory, although their migrations do not extend to very great distances, and are probably regulated by the abundance or scarcity of food. The time of the return of certain species to certain coasts, is very confidently reckoned upon by the natives of the north and by seal-hunters.

Seal-hunting—or *fishing*, as it is often called—requires great patience and skill. Most of the seals, if not all, are gregarious, and one seems to be always placed on the watch, where danger is to be apprehended from bears or from hunters. They climb up through holes in the ice-fields of the polar seas, even when there is a height of several feet from the water, but it is difficult for the hunter to get between them and the hole. Nor is seal-hunting unattended with danger, an enraged S. being a formidable antagonist, at least to the inexperienced.

Seal-hunting is the great occupation of the Greenlanders, but it is also extensively prosecuted in other northern parts of the world; great numbers are taken on the coasts of Newfoundland and other northern parts of America; whale-fishers kill seals as they find opportunity; and vessels are fitted out expressly for the purpose, from the northern parts of Europe and of America.

SEALING-WAX. A composition of hard resinous materials used for receiving and retaining the impressions of seals. Simple as it may appear, its manufacture is one of great importance, and formerly was far more so than at present—the use of gummed envelopes having to a great extent superseded it. Common beeswax was first used in this country and in Europe generally, being mixed with earthy materials to give it consistency. Nevertheless, it was difficult to preserve it, as a very small amount of heat softened it.

The Venetians, however, brought the Indian sealing-wax to Europe, and the Spaniards received it from the Venetians, and made it a very important branch of their commerce. The great value of the Indian wax consisted in the fact that it was made only of shell-lac, coloured with vermilion or some other pigment, and this has been found superior to all other materials. In addition to the shell-lac and colouring material, there is always added to the wax made in Europe a portion of Venetian turpentine (see TURPENTINE), and of resin.

SEA-LION. See OTARY.

SEA-LION, in Heraldry, a monster consisting of the upper part of a lion combined with the tail of a fish.

SEAL ISLANDS, or LOBOS ISLANDS. See PERU.

SEALKOTE, a town in the Punjab, near the left bank of the Chenab, 65 miles north-north-east from Lahore. It contains about 20,000 inhabitants, and carries on the manufacture of paper. S. was formerly a military station, and at the period of the outbreak of the Indian mutiny, there was a rifle-practice dépôt here. All the European troops had been removed in July 1857 to repress disturbances that had broken out elsewhere, and on the 9th of that month the native troops fired on their officers. A considerable number of Europeans were killed, and the survivors suffered great privations until the sepoys, having plundered the station, started off in the direction of Delhi.

SEAL OF CONFESSION. See CONFESSION and CONFIDENTIALITY.

SEAMEN are technically those persons below the rank of officer, who are employed in navigating decked vessels on the high seas—men working on lakes and rivers being usually styled 'watermen.' Two opposite conditions are essential to the well-being of the vessel—first, the absolute subordination and perfect obedience of the crew to the master; and secondly, their protection against tyranny or caprice on his part. For this purpose the law of England is extremely minute in the rules laid down for both masters and seamen.

By an act of 1845, specially levelled against pimps and swindling agents, no person may hire seamen except the owner or master of a ship, and individuals licensed for that purpose by the Board of Trade. Under the Mercantile Marine Act of 1850, a written agreement must be made when a man is engaged, setting forth the nature and length of voyage, the capacity in which the man is to be employed, wages, fines, provisions, punishments, &c. If the ship be going abroad, this agreement must be attested before a shipping-master, who has a power of periodical inspection over the agreements of all seamen in vessels in his port. Any clause in the agreement would be inoperative which deprives the sailor of a lien upon his ship, or of other recovery for his wages, or of rights of salvage. In virtue of this agreement the seaman is bound to do his utmost in the service of the vessel; and consequently, if a master of a ship in distress promise his men extra pay for extraordinary exertions, the men cannot compel him to fulfil his promise.

In the event of disobedience or insubordination the master may administer correction, the law holding him responsible that such correction is reasonable. Desertion from the ship is punishable by imprisonment; and deserters may be apprehended on the information of the master without warrant. In case of open mutiny, the master may adopt the most stringent measures.

The mariners' wages are contingent on the success of the voyage; consequently, if the ship be lost or taken, the seamen lose their claim on the owners. It is a misdemeanour for the master to leave a sailor on shore in foreign parts, unless through the man's wrongful act.

SEA MOUSE (*Aphrodite*), a genus of dorsibranchiate annelida, of the family *Aphroditidæ*, to all of



Sea Mouse (*Aphrodite aculeata*).

which the popular name is extended. They are readily distinguished by two longitudinal ranges of broad membranous scales covering the back, under which are the gills in the form of little fleshy crests. The scales move up and down as the animal respires; and are concealed by a substance resembling tow or felt, which permits the access of water but excludes mud and sand. The head is furnished with tentacles; some have two eyes and some four. The body is edged with spines. Besides all this, its sides are covered with flexible bristles or silky hairs, which give to these creatures a wonderful beauty of colour, unsurpassed by that of humming-birds or the most brilliant gems. Each hair even when viewed singly, and moved about in the sunshine, reflects all the hues of the rainbow. Yet sea-mice are generally to be found concealed under stones, and dwell amongst the mud at the bottom of the sea. Storms frequently throw them on the beach in great numbers. A very beautiful species, *A. aculeata*, of an oval form, about 6 or 8 inches long, and 2 or 3 broad, is the Common S. M. of the British coasts.

SEA PIKE (*Centropomus undecimalis*), a fish, which, notwithstanding its popular name, belongs to the perch family. Its form, however, is elongated like that of the pike. The body is compressed; there are two dorsal fins; the mouth is not very large; and the teeth are numerous, small, and equal. The colour is silvery-white, tinged with green on the back. It is found on the western coasts of tropical America. It attains a large size, and is a valuable fish. On the British coasts, the name S. P. is sometimes given to the Garfish.

SEA PINK. See Thrift.

SEARCH OF ENCUMBRANCES means the inquiry made by a purchaser or mortgagee of lands as to the burdens and state of the title, in order to see whether his purchase or investment is safe. Owing to the want of any general system of registration of deeds affecting land in England, it is not possible by any search to find out with certainty all these burdens; nevertheless, there are some special registers which are usually included in such searches, such as judgment debts, bankruptcies, disentailing deeds, annuity deeds, &c. The search usually goes back for 60 years. In Scotland, where all the deeds affecting land rights are registered, it is easy to discover the exact state of the title and burdens on the land. The usual search is made only for 40 years. The registers are subdivided into various kinds—as the general and particular Register of Sasines, the Record of Abbreviates of Adjudications, Register of Inhibitions, &c. See Records.

SEARCH-WARRANT is an authority granted to a constable by a justice of the peace to enter the premises of a person suspected of secreting stolen goods, in order to discover, and if found to seize the goods; and similar warrants are granted to discover property in respect of which other offences are committed. Before such a warrant can be issued, a credible witness must on oath prove a reasonable cause to suspect that the party proceeded against has the property in his possession or in his premises. The name of the person whose premises are to be searched must be correctly described in the warrant.

SEA-SERPENT. There are in the tropical and sub-tropical seas from the southern coasts of Asia to the South Sea Islands, numerous sea-serpents, which in so far as they are yet known, are all venomous, and belong to the family *Hydridæ* (q. v.). None of them, however, is known to exceed 5 feet or thereby in length, so that their existence cannot account for the stories which from time to time have been published of the appearance of a Great Sea-serpent, which, moreover, generally relate to the Atlantic Ocean, where none of the Hydridæ have yet been found. It is still doubtful whether or not the Great Sea-serpent ought to be reckoned among creatures merely fabulous or imaginary. Pontoppidan speaks of it in his *Natural History of Norway*, assigning to it a length of 600 feet, and describes it, not from personal observation however, but from the testimony of others, as lying in the water in many folds, and appearing like many hogs' heads floating in a line, at a considerable distance from each other. Such a creature is said to have

appeared more recently on the coast of Norway, in 1819, and to have been seen daily for a whole month, seeming to doze in the sunbeams; and again there is a story of its appearing in 1822, and another of its appearing in 1837, when it greatly alarmed some fishermen who thought that it followed their boat. Hans Egede mentions its appearance on the coast of Greenland in 1734. Mr M'Clean, the minister of a parish in the Hebrides, saw a sea monster in 1809, which, however, he supposed to be only 70 or 80 feet long, of serpent-like form; which was also seen, about the same time, by the crews of a number of fishing-boats, and caused them great alarm. In his description of this animal, he distinctly states that it seemed to move by 'undulation *up and down*,' which is not only contrary to all that is known of serpents, but from the structure of their vertebræ, impossible. (See SERPENTS.) Several instances have occurred of the supposed appearance of the Great Sea-serpent on the Atlantic coasts of North America. In June 1815, and in August 1817, it is said to have been frequently seen, in calm bright weather, near Gloucester, about 30 miles from Boston, on the surface of the water, like a number of buoys in a line, and sometimes moving very rapidly. Testimonies vary as to the length, from 80 feet to 250 yards. We hear again of the Sea-serpent as seen off Nahant, near Boston, in August 1819, in calm and serene weather, making curves 'perpendicular to the surface of the water,' and its eye 'brilliant and glistening.' A similar account is given of its appearance off Nahant in July 1833. In Silliman's *Journal of Science* for 1835 there is a notice of such an animal seen by the captain and crew of an American brig, on her passage from Boston to New Orleans, and also of a similar occurrence in lat. 34½°, and long. 48° W. Great interest was excited in 1848 by an account of a Great Sea-serpent seen in lat. 24° 44′ S., and long. 9° 20′ E., and therefore in the South Atlantic Ocean, near the Tropic of Capricorn, and not very far from



Sea-serpent.
(From Pontoppidan.)

the coast of Africa, by the officers and crew of her Majesty's frigate *Dædalus*. It was not, as in other cases, in bright and fine weather, but in dark and cloudy weather, and with a long ocean swell. The animal was swimming rapidly, and with its head and neck above water. Captain M'Quhae, in his Report to the Admiralty, describes it with confidence as 'an enormous serpent, with head and shoulders kept about 4 feet constantly above the surface of the sea;' and he adds: 'as nearly as we could approximate by comparing it with the length of what our maintopsail-yard would shew in the water, there was at the very least 60 feet of the animal *à fleur d'eau*, no portion of which was, to our perception, used in propelling it through the water, either by vertical or horizontal undulation. It passed rapidly, but so close under our lee-quarter, that had it been a man of my acquaintance, I should have easily recognised his features with the naked eye; and it did not, either in approaching the ship or after it had passed our wake, deviate in the slightest degree from its course to the south-west, which it held on at the pace of from 12 to 15 miles per hour, apparently on some determined purpose. The diameter of the serpent was about 15 or 16 inches behind the head, which was, without any doubt, that of a snake; and it was never, during the twenty minutes that it continued in sight of our glasses, once below the surface of the water; its colour a dark-brown, with yellowish-white about the throat. It had no fins, but something like the mane of a horse, or rather a bunch of sea-weed, washed about its back.' Regret has been very naturally expressed that Captain M'Quhae did not bestow a shot on it. Figures prepared from a sketch by him were published in the *Illustrated London News* of 28th October 1848. About the same time, the testimony of another witness, Lieutenant Drummond, appeared, and was found to differ in some important points from the account of the animal given by Captain M'Quhae, and the figures published with his approbation, particularly in ascribing a more elongated form to the head, in the mention of a back-fin, whereas Captain M'Quhae expressly says that no fins were seen; and in a lower estimate of the length of the portion of the animal visible. Lieutenant Drummond's words are: 'The appearance of its head, which, with the back fin, was the only portion of the animal visible, was long, pointed, and flattened at the top, perhaps 10 feet in length; the upper jaw projecting considerably; the fin was, perhaps, 20 feet in the rear of the head, and visible occasionally; the captain also asserted that he saw the tail, or another fin about the same distance behind it; the upper part of the head and shoulders appeared of a dark-brown colour, and beneath the under jaw a brownish-white. It pursued a steady and undeviating course, keeping its head horizontal with the water, and in rather a raised position, disappearing occasionally beneath a wave for a very brief interval, and not apparently for the purposes of respiration. It was going at the rate of perhaps from 12 to 14 miles an hour, and when nearest was perhaps 100 yards distant. In fact, it gave one quite the idea of a large snake or eel.' Lieutenant Drummond's account is the more worthy of regard, as it is derived from his log-book, and so gives the exact impressions of the hour, whilst Captain M'Quhae's was written from memory after his arrival in England. Into the discussion which arose concerning this case, it is out of our power to enter.

There is no reason to doubt the truthfulness of the statements made in any of these cases, although, in most of them, there is room for doubt as to the accuracy of observation. It has been suggested, and not without much appearance of probability, that the supposed sea-serpent might in some instances be a mere line of porpoises or such cetaceans, which often follow one another in lines. It has been thought that a line of floating sea-weed might account for the appearances presented. It has also been suggested that the creature seen from the *Dædalus*, might be a sea-elephant or other large seal, swimming for its life, far from land. And Dr Owen has expressed much doubt as to the existence of a Great Sea-serpent on the ground that no bones or other remains of any such recent animal have occurred; and this negative evidence he regards as more than enough to counterbalance all the positive evidence yet adduced in favour of its existence. It is, however, to be remembered, that there are many fishes which inhabit the depths of the ocean, and seldom visit the shallower waters near the shores,

some of which are scarcely known except by single specimens; and the same thing is true as to Cetacea; so that it is very far from improbable that many species belonging to the ocean depths are still unknown to us. As to the Great Sea-serpent, if we should admit the general accuracy of the accounts given of it by those who supposed themselves to have seen it, there is no reason for concluding it to be a reptile; it might at least as easily be supposed to be a fish of elongated form, and, indeed, much more probably, as a reptile would need to come to the surface to breathe, which a fish would not. The first volume of the *Wernerian Society's Transactions* contains an account of an animal, 56 feet long, which was cast ashore on the island of Stronsa, one of the Orkneys, in 1808, and of which some of the vertebræ are preserved in the Museum of the University of Edinburgh, but which, unfortunately, did not come under the observation of any competent naturalist in its perfect state. On the high authority of Dr Owen, it is pronounced to have been a basking shark; but other men of science have expressed a different opinion.

SEA-SHORE, or land bordering on the sea, belongs partly to the crown, and the public have certain rights in relation thereto. The soil or property in the sea-shore is vested in the crown, and the limit on the land side is defined to be the medium line of high-water of all the tides in the course of the year, or the height of the medium tides in each quarter of a lunar revolution during the whole year. But though the crown is *prima facie* the owner of the sea-shore, the owner of the adjoining manor has sometimes a grant of it, and he proves this grant by ancient use—such as gathering sea-weed, &c. The public have a right to walk on that part of the shore vested in the crown, which holds it as a trustee for them. But the public have no right to trespass on the adjacent lands in order to get at the shore, so that it is only where a highway leads to the shore, or the public land from seaward, that the right can be made available. Thus it has been decided that the public have no legal right to trespass on the adjoining lands in order to get to the shore for purpose of bathing. The public have a right to fish on the sea-shore if they get legal access to it, and may take all floating fish, but not oysters or mussels which adhere to the rock, if the soil belongs to an individual. The public have no right to gather sea-weed or shells, though, as regards the latter, it is of so little consequence that nobody prevents them. Nor have fishermen a right to go on that part of the sea-shore which is private property to dig sand for ballast, or to dry their nets, or similar purposes, though in a few cases local customs permitting this have been held valid. In Scotland, the right to the sea-shore is also vested in the crown, but when a crown grant gives land bounded by the sea-shore, this is held to give to the grantee the fore-shore also.

SEA-SICKNESS is a variety of vomiting deserving of special notice. It is often preceded by premonitory symptoms, which appear almost immediately after a susceptible person is exposed to the motion of rolling water in a vessel or boat, and are as distressing as the vomiting itself. Amongst these symptoms may be mentioned vertigo and headache, with a peculiar feeling of sinking and distress about the pit of the stomach. Vomiting, however, in general, soon comes on, accompanied with convulsive heaving of the stomach, and such an indescribable feeling of prostration as to render the patient utterly regardless of what is going on around him, and almost indifferent to life. Moreover, a deadly pallor, a profuse cold sweat, and diarrhœa, are more or less commonly present. The susceptibility to this troublesome affection varies extremely in different persons. Some never suffer from it, others only on their first voyage, and others, again, in every voyage they undertake; with some it continues but a few hours, while others suffer almost continuously throughout a long voyage. In the great majority of cases, the sickness disappears in a few days, unless the weather be very boisterous. It almost always ceases on landing, although more or less giddiness may prevail for some hours, the patient when walking feeling as if the earth were rising up under his feet. Infants and aged persons are supposed to possess a comparative immunity from sea-sickness, while, as a general rule, women suffer more than men. According to Dr Althaus, persons with a strong heart and a slow pulse generally suffer little from sea-sickness; while irritable people, with a quick pulse and a tendency to palpitation, are more liable to be affected; and he thus accounts for different liability of different nations to this affection; 'for, as a rule, the French and Italians, being of a more irritable temper, suffer most from the disorder, the Germans less, and the English least.' ('On Sea-sickness as a form of Hyperæsthesia,' in *Proceedings of the Medico-Chirurgical Society*, vol. v. p. 23.)

The primary cause (or rather condition) of sea-sickness is the motion of the ship; and the *pitching* of a vessel, or alternate rising and falling of the bow and stern, is especially apt to produce it. It is less felt in large and heavily ballasted vessels, because the movements referred to are least perceptible in them. How this cause operates is a subject regarding which there has been much discussion; and without entering into the history of the views of different physicians on this subject, we may state that the most recent is that of Dr Chapman, who holds that the motions of the vessel cause the accumulation of an undue amount of 'blood in the nervous centres along the back, and especially in those segments of the spinal cord related to the stomach, and the muscles concerned in vomiting.' This condition is induced, as he maintains, in three different ways, viz., (1.) by the movements of the brain, which are much greater in a pitching vessel than on land; (2.) by the corresponding movements of the spinal cord; and (3.) by the excessive movements of the viscera within the abdominal and pelvic cavities. In one person the brain may be mainly responsible in causing that preternatural afflux of blood in the spinal cord, on which (according to Dr Chapman's hypothesis) sea-sickness depends; in another, the spinal cord may be the main agent; and in a third, the abdominal viscera; although each is always concurrent in some degree. Hence, the only scientific and really effective remedy for this disorder, must be one which has the power of lessening the amount of blood in the whole of the nervous centres along the back, and this can be done by lowering the temperature of the spinal region by the local application of ice. For a description of Dr Chapman's 'spinal ice-bags' (which may be obtained from any respectable surgical instrument-maker), and for the method of applying them, we must refer to his work *On Sea-sickness; its Nature and Treatment*, p. 37 (Lond. 1864). He gives the details of 17 cases in which the ice-bags were of greater or less benefit; in most of the cases, the result was perfectly successful. Besides Dr Chapman's evidence we have that of Captain White, commander of one of the Newhaven and Dieppe boats, who states that 'in ordinary weather it [Dr Chapman's remedy] is a success. I had some difficulty in persuading passengers to try it, but those who did were benefited.' Mr Bradley, surgeon in the

Cunard Service, in a letter to *The Lancet*, December 3, 1864, writes as follows: 'I have tried this remedy *in severe cases when other remedies have failed* (chloroform, iced champagne, effervescing draughts, fresh air, &c.), and have very generally found it do great good. In no case does it do harm, but in the great majority of instances it soothes the nervous irritability which so commonly accompanies severe sea-sickness, induces sleep, and consequently relieves exhaustion.' We are permitted to publish the following extract of a letter from Dr Hayle of Rochdale, to Dr Chapman, dated June 3, 1865: 'I recommended a patient about to cross the Atlantic, to try one of your ice-bags for sea-sickness. The result was most satisfactory. He was never sick when wearing the bag. Once he went without it, and then, and then only, was he sick. His friend, who had no ice-bag, was frequently sick.' As an ancillary remedy, the drinking of iced water, or the swallowing of small lumps of ice, may be recommended. Dr Chapman prefers the ice, which, 'brought in contact with the peripheral ends of the nerves of the stomach, will act on the same principle as it does when applied to the spinal region.'

Those who are susceptible to this distressing affection, and have not the opportunity of trying the ice-bags, may, at all events, diminish the severity of the vomiting by assuming, and as long as possible retaining, the horizontal position, as nearly as possible in the centre of the ship's movement, and keeping the eyes closed. The compression of the abdomen, by means of a broad tight belt, sometimes gives relief. A few drops of chloroform on a lump of white sugar will sometimes check the tendency to vomiting in persons who only suffer slightly. A little arrowroot, flavoured with brandy or sherry, is usually a kind of food that will most easily remain on the stomach, when the severity of the symptoms is abating. Dr Wood, one of the most eminent of the American physicians of the present day, asserts that he has 'found nothing under such circumstances so acceptable to the stomach as raw salt oysters.'

SEASIDE GRAPE (*Coccoloba uvifera*), a small tree, of the natural order *Polygoneæ*, a native of the West Indies. It grows on the sea-coasts; has orbicular, cordate, leathery, shining, entire leaves, and a pleasant, subacid, eatable fruit, somewhat resembling a currant, formed of the pulpy calyx investing a bony nut. The extract of the wood is extremely astringent, and is sometimes called JAMAICA KINO. The wood itself is heavy, hard, durable, and beautifully veined.

SEA SLUG. See HOLOTHURIA.

SEASONING, a term in Cookery for the materials used to add flavour to food. They are chiefly salt, the spices, and pot-herbs. Salt is the most important, for it not only increases the sapidity of most kinds of food, but also adds to their wholesomeness.

SEASONS. In the article EARTH, the motions of the earth on which the changes of the seasons ultimately depend, are explained. The chief cause of the greater heat of summer and cold of winter is that the rays of the sun fall more obliquely on the earth in the latter season than in the former. See CLIMATE. Another concurrent cause is the greater length of the day in summer, and of the night in winter. Within the tropics, the sun's rays have at no time so much obliquity as to make one part of the year very sensibly colder than another. There are therefore either no marked seasons, or they have other causes altogether, and are distinguished as the *Wet* and *Dry* seasons. This is explained in the article RAIN. But in all the temperate parts of the globe, the year is naturally divided into four seasons—*Spring*, *Summer*, *Autumn*, and *Winter*. In the arctic and antarctic regions, spring and autumn are very brief, and the natural division of the year is simply into summer and winter, the winter being long, and the summer short; and this is very much the case also in regions of the temperate zones lying near the arctic and antarctic circles. In subtropical regions, the distinction of four seasons is, in like manner, very imperfectly marked. This distinction is everywhere arbitrary as to the periods of the year included in each season, which really vary according to latitude, and partly according to the other causes which influence climate; the seasons passing one into another more or less gradually, and their commencement and close not being determined by precise astronomical or other phenomena. The greatest heat of summer is never reached till a considerable time after the summer solstice, when the sun's rays are most nearly vertical, and the day is longest; the greatest cold of winter is in like manner after the winter solstice, when the day is shortest, and the sun's rays are most oblique; the reason in the former case being, that as summer advances the earth itself becomes more heated by the continued action of the sun's rays; in the latter, that it retains a portion of the heat which it has imbibed during summer, just as the warmest part of the day is somewhat after midday, and the coldest part of the night is towards morning. The four seasons of temperate regions are distinguished by the phenomena of nature which characterise them, and which are of the greatest importance in relation to the wants and labours of man. But the renewal of vegetative activity in spring is not to be ascribed entirely to the increasing warmth of the sun's rays. Plants are so constituted that a period of rest is followed by new activity, and this new activity very generally begins in the fresh circulation of sap and enlargement of buds whilst the cold of winter still continues unabated, or before it has reached its greatest intensity. A similar remark may be made with regard to some of the phenomena of animal life, which may as well be said to herald the approach of spring as to attend its first days of genial weather.

SEA URCHIN. See ECHINIDÆ.

SEAWEED and **SEA WRACK.** See FUCACEÆ and WRACK.

SEBASTIAN, SAINT, a very celebrated martyr of the early church, whose memory is venerated in both branches of the church, east as well as west (although the scene of his martyrdom was the city of Rome), and whose story has formed one of the most popular themes of Christian artists from the earliest times. His history is contained in the so-called acts of his martyrdom, which, although partaking of the legendary tone, are regarded as authentic, not only by Baronius and the Bollandists, but also by Tillemont and others of the more stringently critical schools of ecclesiastical history. S., according to this narrative, was born at Narbonne and educated at Milan. Although a Christian, he entered the Roman army, without, however, revealing his religion, and with the view of being enabled, by his position, to assist and protect the Christians in the persecution. In this way he supported and comforted many of the martyrs in Rome; and he even converted Nicostratus, the keeper of the prison in which the martyrs were confined, and his wife, Zoe, to whom he miraculously restored the use of her speech, after she had been dumb for six years. Still unrecognised as a Christian, S. rose to high favour under Diocletian, while at the same time the grateful pontiff, Caius, named him

'Defender of the Church.' At length came the time for his open profession of his faith. Diocletian used every effort to induce him to renounce the Christian creed, but in vain; and in the end he was condemned to be put to death by a troop of Mauritanian archers, who transfixed him with numberless arrows, and left him as dead. But a Christian lady, Irene, finding that life was not extinct, had the body removed to her house, where life was restored; and although the Christian community desired to conceal his recovery, S. again appeared in public before the emperor, to profess his faith in Christianity. Diocletian condemned him to be beaten to death with clubs in the amphitheatre: and his body was flung into one of the sewers of the city, in which it was discovered, according to the Acts of Martyrdom, by means of an apparition, and carried by a Christian lady, Lucina, to the catacomb, which is still called by his name. The date of his martyrdom was January 20, 288. By the Greeks the feast is held on the 20th December. The festival was celebrated with great solemnity in Milan as early as the time of St Ambrose; and it was observed in the African Church in the 4th century. There is another saint of the same name, who is said to have suffered martyrdom in Armenia.

SEBASTIANI, FRANCOIS-HORACE-BASTION, marshal of France, was born November 10, 1772, at Porta d'Ampugnano, a village near Bastia, in Corsica. He was the son of a tailor, but his extreme vanity led him to declare himself of noble descent and a distant relative of the Bonapartes. He entered the army as a sub-lieutenant of infantry, August 27, 1789. His rise, due to his bravery in the field, was no doubt somewhat aided by his splendid physique, graceful manner, and facile diction. He became *chef-d'escadron* in 1797, and brigadier in 1799, and was one of Napoleon's most devoted partisans. He fought at Marengo, executed some important diplomatic service in Turkey in 1802—1803, after which he became general of brigade (August 1803), and was wounded at Austerlitz. On May 2, 1806, he was again deputed to Turkey, this time to break the alliance of the Porte with Russia and England: and before he had been seven months at Constantinople, his mission had obtained complete success, and war was declared. The English fleet forced a passage through the Dardanelles, and cast anchor before Constantinople, their presence causing such terror among the sultan's ministers that a total reversal of foreign policy was imminent, but S., coming to the rescue, revived with his seducing eloquence their failing resolution, and assuming an authoritative superintendence of the preparations for defending the coast, put the batteries in a state fit for action. In five days, he had the coast batteries manned with 600 guns, 100 small gunboats afloat, a line of vessels laid along shore, each with a broadside ready to be discharged on the English fleet, which at last gallantly ran the gantlet, losing two ships and 700 men. But the death of the sultan, and the treaty of Tilsit, put an end to the French intrigues in Turkey, and S. was recalled June 1807, and decorated with the grand cordon of the Legion of Honour. He subsequently commanded the fourth corps-d'armée in Spain. He distinguished himself in the Russian campaign of 1812, and at Leipzig. On the exile of Napoleon to Elba, he gave in his adherence to the Bourbon government, but joined his old master on his return. After the revolution of 1830, he held for brief periods the portfolios of naval (1830) and foreign affairs, and the embassies to Naples (April 1833) and London (January 1835); but was more distinguished for his elegance, and graceful demeanour in the Parisian salons, than as a politician or administrator. He died at Paris, July 20, 1851.

SEBASTIANI'STAS, the name given in Portugal and Brazil to persons who believe in the future return to earth of the king Dom Sebastian, who fell in the battle of Alcazarquebir, 1578 A.D., while leading on his army against the Moors. This belief has continued to be entertained by many in Portugal; but the S. are said to be now most numerous in Brazil. On the return of Dom Sebastian, they expect Brazil to enjoy the most perfect prosperity and happiness.

SEBASTO'POL, or, as it is sometimes written, in accordance with modern Greek pronunciation, SEVASTOPOL (*Sebastopolis*, the 'august city'), a Russian seaport, fortress, and arsenal in the Crimea, in the government of Taurida. It is situated near the south-west extremity of the Crimea, on the southern side of the magnificent harbour or roadstead of S., one of the finest natural harbours in the world. This harbour is an inlet of the Black Sea, stretching inland for about four and a half miles from west to east, about half a mile wide at the entrance, but immediately opening out to the width of a mile, with an average width of about half a mile up to the eastern end. It is sheltered on the north and south by lofty limestone ridges shutting it completely in, with a depth of water varying from 3 to 11 fathoms, and sufficient in several places to allow ships of the largest size to lie close to the shore. At the eastern end, under the heights of Inkermann, the river Tchernaya enters the harbour through low marshy ground. The South Bay, or Dockyard Harbour as it is also called, extending about one and a half miles from north to south, forms the harbour proper of S.; and between it and Quarantine Bay, occupying rather more than half the peninsula thus formed, is built the chief portion of the town of S., on ground sloping irregularly upwards. The town, previous to its destruction in the siege of 1854—1855, was well and substantially built of stone, with lines of streets running from north to south, and smaller ones intersecting them at right angles, containing several handsome public edifices. The docks, constructed for the Russian government by Colonel Upton, an English civil engineer, were among the most important works at S.: the dock basin, docks, and quays were formed in the most substantial way, being partly cut in the solid rock, and lined with cement, partly built of limestone and granite. From the Dockyard Creek, ships were admitted into the Dock Basin by means of three locks, the bottom of the docks being above the sea-level, and the basin was supplied with water by a canal some 12 miles in length from the Tchernaya above Inkermann—itself a work of no inconsiderable magnitude. For the defence of town and harbour from attack by sea, several forts were erected. These forts were works of immense strength, built of limestone faced with granite, on which artillery was found to make but little impression; they mounted a very large number of guns, and by their cross-fire completely protected every spot accessible to a hostile fleet. On the land side, with the exception of a slight loopholed wall extending partially round the western side, the town, previous to the siege, was entirely undefended; but the earthworks and fortifications then successively extemporised by the genius of General Todleben, which for so many months kept the armies of France and England at bay, and of which the Malakoff and the Redan were the most formidable, are now of historic fame.

The siege of S. by the allied English and French armies will rank among the most famous sieges in

history; it lasted for 11 months, from October 1854 to September 1855; the place sustained repeated bombardments, the first of which took place October 17, 1854; and the capture of the Malakoff and Redan, on September 8, 1855, at length forced the Russians to evacuate it, and retire to the north side. The town had been completely ruined; the docks and forts (such as were still standing) were afterwards blown up by French and English engineers. By the treaty of Paris (March 1856), the naval and military works are not to be restored. Before the siege, the population of S., including the soldiers and marines forming the garrison, amounted to about 40,000. Since that time the town has been partially rebuilt and reinhabited, but the population is probably very small. S. was intended to be the station of the Russian Black Sea fleet, and as such to form a standing menace to Turkey; during the siege, the fleet was almost entirely destroyed, many of the ships having been sunk by the Russians across the entrance of the harbour by way of defence. The great disadvantage of S. as a naval station arises from the ravages of the *Teredo navalis*, which soon render wooden vessels unseaworthy. S. was founded on the site of a small Tartar village called *Akhtiar*, immediately after the Russian conquest of the Crimea in 1783, under the orders of the Empress Catharine II. The promontory on which S. stands is a spot of considerable classical and historical interest. Here, perhaps on the site now occupied by the Greek convent of St George, west of Balaclava, stood the temple of the Tauric Artemis, in which, according to the legend, Iphigenia, daughter of Agamemnon, was priestess. In later times, the promontory was colonised by Greeks from Heraclea, in Asia Minor, and became known as the Heracleotic Chersonese. Two cities, successively built a few miles apart on the sea-coast to the west of S., have left remains existing to the present day. In after times, the Chersonesus fell into the power of the Genoese, who established their headquarters at Balaclava, where the remains of the 'Genoese castles' on the heights still bear witness to their rule. See *History of the Russian War* (W. and R. Chambers).

SEBE'NICO, a small port on the coast of Dalmatia, 42 miles south-east of Zara. It is built on a steep slope, and rises in terraces, and was formerly defended by walls and towers. Its cathedral, a fine edifice with a bold dome, was built 1443—1536. Its excellent harbour is defended by several forts. Pop. about 7000.

SEBE'STEN, SEBESTAN, SEPISTAN, or **S. PLUM**, the fruit of the *Cordia Myxa*, a tree of the natural order *Cordiaceæ*, a native of the East Indies. The tree has ovate leaves, and an egg-shaped fruit, which is succulent, mucilaginous, and emollient, with some astringency, and was formerly an article of the European Materia Medica, being employed for the preparation of a lenitive electuary and of a pectoral medicine. It is believed to be the *Persea* of Dioscorides. It has a sweetish taste, and is eaten by the natives of the Northern Circars of India, where it grows.

SE'CALE. See Rye.

SE'CANT. See Trigonometry.

SECE'DERS and SECESSION KIRK. See United Presbyterians.

SECLU'SION (of the Insane). This term has recently been narrowed so as to apply to the removal of the violent insane from the ordinary wards and fellowship of an asylum to an airing court, gallery, or room so situate and furnished that its solitary occupant can neither injure himself, nor injure nor disturb others. Since the abolition of physical restraint by chains and strait-jackets, seclusion has become a favoured and useful mode of repression and treatment. That it should be resorted to exclusively as a remedial agent, and by the medical attendant, are now received as axioms. In 1854, the Commissioners in Lunacy in England ascertained, by circular, the opinions of almost all those intrusted with the care of the insane in that country, as to the employment of such means of cure; when it appeared that it was generally considered beneficial, if used for short periods and during paroxysms of epileptic and violent mania. Even when not absolutely required for the tranquillisation of the individual, seclusion may become expedient in order to secure the quiet, comfort, or safety of the patients with whom he is associated. That such an instrument may be abused and adopted from the parsimony, timidity, or ignorance of those around, is obvious. One of the lunatics liberated by Pinel, in 1792, had been incarcerated or *secluded* in his dark cell for forty years; and occasionally even now the duration of the isolation may be unduly prolonged even under medical sanction; but the instances of gross and cruel seclusion in garrets and cellars, and outhouses, are now chiefly to be found in private families, and where, as in the 'Flushing case,' no better course is known to be practicable.—*Eighth Report of Commissioners in Lunacy to Lord Chancellor*, App. C, p. 123; Bucknill and Tuke, *Psychological Medicine*, p. 562; Browne, *What Asylums Were, Are, and Ought to be*, p. 137.

SECOND (for the derivation of which see Scruple) is the sixtieth part of a minute, whether of time or of angular magnitude. See Minute. In old treatises we find seconds distinguished as *minutæ secundæ*, from minutes, or *minutæ primæ*. The sixtieth part of a second was called a third, but instead of this and succeeding subdivisions, decimal fractions of seconds are now employed.

SE'CONDARY, in Geology, is the designation given to that large section of the fossiliferous strata which includes the Triassic, Oolitic, and Cretaceous rocks. It is synonymous with Mesozoic. The strata grouped under this title are separated from the inferior and superior deposits more by their organic contents than their petrological structure, and this separation is more evident between them and the older rocks, than between them and the newer, and yet recent discoveries have shewn that the St Cassian Beds form a connecting link between the Permian and Triassic epochs. They contain a series of fossils which are partly Palæozoic and partly Mesozoic in their facies.

The appearance of the great types of all subsequent organisms in the Secondary rocks, has suggested the grouping of the fossiliferous strata in respect of their fossils into only two great divisions —viz., the Palæozoic and the Neozoic—this last term including the Secondary and Tertiary periods.

SECONDING is a temporary retirement to which officers of Royal Artillery and Royal Engineers are subjected when they accept civil employment under the crown. After six months of such employment the officer is seconded, by which he loses military pay, but retains his rank, seniority, and promotion in his corps. After being seconded for ten years, he must elect to return to military duty or to retire altogether.

SECOND SIGHT, a superstition or belief once common in the Scottish Highlands and Isles, where it was known by the Gaelic appellation *Taisch*, signifying a spectral or shadowy appearance. Certain persons, called seers or wizards, were supposed to possess a supernatural gift, by which they

involuntarily foresaw future events, and perceived distant objects as if they were present:

> As the sun,
> Ere it is risen, sometimes paints its image
> In the atmosphere, so often do the spirits
> Of great events stride on before the events,
> And in to-day already walks to-morrow.
>
> WALLENSTEIN.

This is to depict the lofty and poetical view of the subject, as illustrated in classic fable and early history. The Highland seer, however, was chiefly conversant with the scenes and occurrences of ordinary life. 'A man on a journey far from home falls from a horse; another who is perhaps at work about the house, sees him bleeding on the ground, commonly with a landscape of the place where the accident befalls him. Another seer, driving home his cattle, or wandering in idleness, or musing in the sunshine, is suddenly surprised by the appearance of a bridal ceremony or funeral procession, and counts the mourners or attendants, of whom, if he knows them, he relates the names, if he knows them not he can describe the dresses. Things distant are seen at the instant when they happen' (Johnson's *Journey to the Hebrides*). With respect to things future, Johnson thought there was no rule for determining the time between the sight and the event; but Martin, whose account of the Western Islands was first published in 1703, furnishes data of this kind in his classification of the visions. If an object was seen early in the morning, the event would be accomplished a few hours afterwards; if at noon, the same day; and if at night, the accomplishment would take place weeks, months, and sometimes years afterwards, according to the time of night the vision was beheld. The appearance of a shroud was an infallible prognostic of death, and the nearness or remoteness of the event was judged by the amount of the body that was covered by the ghastly sheet; if it was not seen above the middle, a delay of a twelvemonth might be hoped for, but if it ascended high towards the head, the mortal hour was close at hand. 'The vision makes such a lively impression upon the seers,' says Martin, 'that they neither see nor think of anything else except the vision, as long as it continues; the eyelids of the seer are erected, and the eyes continue staring until the object vanish.' The power of the seer was involuntary and painful—it was no source of gain. The gradation of symbolical appearances we have mentioned, strikes the imagination and gives something like a system to the supernatural phenomena. But if we turn to the cases described by the historians of the second sight, we do not find such regular order and exactness. The evidence is vague and confused, and the incidents are often of the most trivial character. The revelations, indeed, were commonly made to poor illiterate men, predisposed from the very nature of the country—wild, dreary, and remote—and from their half-idle, solitary life, to melancholy and superstition. These causes must have led very early to belief in the second sight. We find it colouring portions of the history of Wallace and Bruce, and associated with the tragic fate of the accomplished James I. of Scotland. A Scottish seer is said to have foretold the unhappy career of Charles I., and another the violent death of Villiers, Duke of Buckingham. In 1652, a Scottish lawyer, Sir George Mackenzie, afterwards Lord Tarbat, when driven to the Highlands by fear of the government of Cromwell, engaged himself in making inquiries concerning this supposed supernatural faculty, and wrote a minute account of its manifestations addressed to the celebrated Robert Boyle, which, with other relations on the same subject, is published in the correspondence of Samuel Pepys. Next came Martin's copious description; then a Highland minister, the Rev. John Fraser of Tyree, collected *Authentic Instances*, which were printed in 1707; and in 1763, appeared the ambitious treatise of *Theophilus Insulanus*, or Macleod of Hamir, which contained the narratives of Fraser, of Aubrey the English antiquary, and other authorities, with the addition of a great number of cases—nearly a hundred—gathered by himself from various sources, and also numerous letters from Highland ministers. This work exhausted the subject, but the wretched vanity, credulity, and weakness of Theophilus covered it with ridicule. A fresh revival took place after the memorable *Journey to the Hebrides* by Dr Johnson, whose work was published in 1775. The second sight was sure to interest a melancholy, meditative 'rambler' like Johnson. He had read of it in his youth in Martin's History. He was naturally superstitious. He had a stout courageous heart and strong nerves in all mundane matters and positions, but he had a morbid fear of death, and an almost childish eagerness to pierce the darkness of futurity, and to believe in the possibility of messages from the other world. Johnson anxiously questioned the clergy and others respecting the supernatural communications made to the seers, and would gladly have believed them real. The evidence, however, was not complete or invincible; and with that love of truth, which was one of the strongest virtues of the sage of Bolt Court, he confessed that he never could 'advance his curiosity to conviction, but came away at last only willing to believe.' On one occasion we find Johnson enunciating the true doctrine in such cases. He observed, as Boswell reports, that 'we could have no certainty of the truth of supernatural appearances unless something was told us which we could not know by ordinary means, or something done which could not be done but by supernatural power; that Pharaoh, in reason and justice, required such evidence from Moses; nay, that our Saviour said: "If I had not done among them the works which none other man did, they had not had sin."' Undoubtedly works or facts, not merely appearances, are required for conviction. Spectral sights may be caused by dreams or disease (see APPARITIONS), by accidental optical illusions, or by the workings of a vivid imagination. It seems degrading to the idea of divine power to suppose that special miracles were wrought to announce the marriage or death of a Highland peasant, the wreck of a boat, or the arrival of a stranger in a remote island of the Hebrides. Ignorance is a great ally of superstition, as solitude is of gloomy egotism and melancholy; and since education has penetrated into the Highlands and Isles, and intercourse with other parts of the kingdom has been facilitated by increasing trade and improved means of communication—to say nothing of the effects of that passion for Highland scenery and sport which every year takes crowds of visitors to the country—the belief in second sight, as in astrology and witchcraft, has almost wholly disappeared from the land. It never had the cruel, hard, and revolting features of witchcraft—formerly prevalent in the Lowlands when scarcely known in the Hebrides—and it still seems picturesque enough to serve for the purposes of poetry and romance.

SECRET (Lat. *secreta*, i. e., *oratio*, the secret prayer), one of the prayers of the Mass (q. v.), of the same general form with the 'Collect,' but recited by the priest in so low a voice as not to be heard by the people, whence the name *secreta* is derived. It follows immediately after the oblation of the Eucharistic bread and wine. This use of silent prayer in

the public service is one of the subjects of controversy between Catholics and Protestants.

SECRET, DISCIPLINE OF THE (Lat. *Arcani Disciplina*), a discipline of the early church, founded upon the words of Christ, 'Give not that which is holy to dogs,' Matt. vii. 6, in virtue of which Christians fully initiated in the doctrine and practice of the church withheld from pagans and catechumens in the preparatory stage the knowledge of certain doctrines, and the liberty of presence at certain rites connected with the most solemn mysteries of the Christian religion. This practice originated in the obloquy which was drawn upon the doctrines of the church from the false and monstrous conceptions of these doctrines which were circulated among pagans. Against these calumnious misconceptions the earliest of the so-called 'Apologies' are addressed; and it seems certain that at the time at which Justin wrote his first Apology, the middle of the 2d c., no objection existed against speaking openly of the mystery of the Eucharist.—(See *Justini Apol.*, i. 66). Very soon after this, however, the 'Secret' is clearly traceable. The first reason for its adoption was that assigned above—namely, to guard the more sacred and mysterious doctrines from popular misconception and blasphemy among the pagans. This precaution of concealment was extended to catechumens, partly in order to avoid shocking too suddenly their half-formed convictions by the more startling improbabilities of Christian belief; partly also, no doubt, to guard against the danger of the betrayal of these mysterious doctrines to pagan spies approaching in the false garb of catechumens. The Discipline of the Secret appears in several forms—(1.) Both unbelievers and catechumens were removed from the church at the commencement of that portion of the liturgy which specially relates to the celebration of the Eucharist—the so-called *Missa Fidelium*. See MASS. (2.) The lectures addressed by the presiding teacher to the great body of the catechumens in general were confined to the general doctrines of Christianity. The more mysterious doctrines, those which regarded the sacraments of Baptism and the Eucharist, called 'Mystagogic,' were only communicated at the close, and to those only who had undergone the preliminary probation. (3.) The Eucharist, if referred to at all in the presence of the uninitiated, was spoken of in words so conceived as to conceal its nature. Many curious examples of this concealment might be cited. Origen, alluding to the Eucharist (Hom. 8, in Exod. 4), says merely: 'The initiated know what I mean.' When Chrysostom was writing to Pope Innocent I. an account of a tumult in the church at Constantinople, in which the sacred cup was overset, and the consecrated elements spilled, he says, without reserve, 'The blood of Christ was spilled.' But Palladius, the deacon, in his Life of Chrysostom, which was designed for the pagans as well as for the Christians, takes the precaution to use the words 'The symbols which are known to the faithful.' Still more curiously, Epiphanius, in citing the well-known words of the Eucharistic formula, 'This is my body,' suppresses the word under which the mysterious idea is contained, and writes, 'This is my *that thing.*' *Touto mou esti tode.* A very curious example of this amphibological language regarding the Eucharist will be seen in a Greek inscription discovered some years since at Autun, in France.—(See *Edin. Rev.*, July 1864).

There is some uncertainty as to the period during which this discipline lasted in the church. It commenced most probably in the time of Justin, as his contemporary, the heretic Marcion, is known to have protested against it as an innovation (Neander's *Kirchen-geschichte*, i. 540). It is even thought not impossible by some that Justin's mode of writing was an exceptional one, and that the Secret may have been in use before his time. On the other hand, it is certain that it outlived the period out of the condition of which it arose, and was maintained long after the ages of persecution. The traces of it had not entirely disappeared in the 6th century.—(See Schelstrate, *Diss. de Discip. Arcani*, 1685; Schollner, *Diss. de Discip. Arcani*, 1756; and on the Protestant side, Tenzel, *De Discip. Arcani* (in reply to Schelstrate); Rothe, *De Disc. Arcani*, Heidelberg, 1831.)

SE'CRETARY, SECRETARY FALCON, SECRETARY BIRD, or SERPENT-EATER (*Gypogeranus*), a genus of birds of prey, which has been variously placed by naturalists among the *Falconidæ* and the *Vulturidæ*, and has been also constituted into a distinct family, *Gypogeranidæ*. The legs are very long, as in the *Grallæ*, to which, however, there is no other resemblance. The *tibiæ* are completely feathered, but the *tarsi* and toes are destitute of feathers. The tarsi are covered in front with long, large scales. The toes are armed with sharp claws; but they are short, and the feet are not formed for grasping. The hind-toe is very short. The neck is much longer, and the whole form of the bird more slender than in the Falconidæ. The wings are long, and armed with a blunt spur at the shoulder. The tail is very long. The best-known species is an inhabitant of the arid plains of South Africa. It is about three feet in length; the plumage bluish-gray. It has an occipital crest of feathers without barbs at the base, which can be raised or depressed at pleasure, and the name Secretary was given to it by the colonists at the Cape of Good Hope from their fancied resemblance to pens stuck behind the ear. It feeds chiefly on reptiles of all kinds, which it devours in great numbers, and is so highly valued on account



Secretary Bird (*Serpentarius secretarius*).

of the constant war which it wages against serpents, that a fine is inflicted in the Cape Colony for shooting it. It fearlessly attacks the most venomous serpents, stunning them with blows of its wing, also seizing and carrying them into the air to such a height that they are killed by the fall. It uses its feet also to overpower its prey, striking violent blows with them. Small serpents are swallowed entire; the larger ones are torn to pieces. The S. is most frequently seen in pairs, or solitary. It is tamed as a protector of poultry-yards; but if not sufficiently fed, is apt to help itself to a chicken

or duckling. An attempt has been made to introduce this bird into Martinique, in order to reduce the number of venomous serpents in that island.—Another species of S. appears to exist in more northern parts of Africa, as about the Gambia; and a third, more widely different, in the Philippine Islands.

SECRETARY OF THE NAVY is the conventional title of the parliamentary secretary to the Board of Admiralty. This post is conferred on a naval officer of high rank, sitting in the House of Commons, in which, when the First Lord of the Admiralty is a peer, he is the exponent of naval policy. He changes of course with the ministry, of which he is a subordinate member; and receives a salary of £2000 a year. There is also a permanent secretary, who holds office for life, and receives £1500 a year. He is responsible for the discipline of the Admiralty Office. This appointment is of long standing, and was held by the celebrated Mr Secretary Pepys.

SECRETARY-AT-WAR, formerly a high officer of the British ministry, had the control of the financial arrangements of the army, and was the responsible medium for parliamentary supervision in military affairs. In the times of the Tudors, the war business of the country appears to have been transacted by the department of the Secretary of State. The formation of a war office proper took place about 1620. The office rose in importance as the army increased; but was limited to financial authority, neither the commander-in-chief nor master-general of the ordnance being subject to it. At length, during the Russian war, the evils of this divided authority led to the creation of a Secretary of State for War, to control all the military departments. The secretaryship-at-war was merged in this superior office in 1855, and though for some years preserved technically as a separate appointment held by the Secretary of State, was abolished by act of parliament in 1863.

SECRETARY OF EMBASSY or of **LEGATION**, the principal of the persons belonging to the suite of an ambassador or envoy. Secretaries of Embassy or Legation hold their commission immediately from the sovereign, who nominates them in general only to ministers of the first and second rank. They are therefore considered a species of public minister; and independently of their attachment to an ambassador's suite, they enjoy in their own name all the privileges and protections of the diplomatic character. They are generally presented in person to the foreign sovereign at whose court they are accredited. The functions of a secretary of embassy or legation consist principally in assisting the chief in the business of the embassy. Moser (*Versuch Th.* iii. p. 94) says: 'An ambassador is often only like the hands of a watch, while his secretary resembles the works.' Secretaries of embassy and legation occupy the post of ambassadors and envoys during the absence of their ministers. A secretary of embassy or legation must not be confounded with the private secretary of an ambassador appointed and paid by him, who has none of the privileges and immunities above-mentioned.

SECRETARY OF STATE, an ancient and important office in the government of England. The oldest record of its existence is in the reign of Henry III., when John Maunsell is described as 'secretarius noster.' Prior to the Restoration, the holder of this office was generally styled the 'king's chief' or 'principal secretary;' he had the custody of the king's signet, and discharged his duties with the assistance of four clerks. Two secretaries are said to have been first appointed towards the close of the reign of Henry VIII. The office, always one of influence, gradually grew in importance. On the Union of 1707, Anne added a third secretary of state for Scotland, which office, however, was soon done away with. In the reign of George III. there were at first but two secretaries; for a time there was a third for America, but his office was abolished by statute in 1782. While the secretaries were two in number, both equally directed home affairs; to the one were committed the foreign affairs of the northern, to the other of the southern department. Irish affairs belonged to the province of the elder secretary.

There are now five principal secretaries of state, who are respectively appointed for home affairs, foreign affairs, war, the colonies, and India. They are all appointed by the sovereign by the mere delivery of the seals of office, without patent, and are always members of the Privy Council and of the Cabinet. Though each has his own department, he is considered capable of discharging the duties of the others; a member of the House of Commons, if removed from one secretaryship to another, does not thereby vacate his seat.

The Secretary of State for the Home Department has the charge of the maintenance of the internal peace of the United Kingdom, the security of the laws, and the administration of justice, so far as the royal prerogative is involved in it. He directs the disposal and employment of the regular troops at home, and provides for the suppression of riots. The militia, yeomanry, and volunteers are entirely under his control. He has the ultimate supervision of all that relates to prisons and criminals; and numerous statutory powers have been given him regarding police, sanitary matters, the regulation of labour, &c. All patents, licences, dispensations, charters of incorporation, commissions of the peace and of inquiry, pass through his office. He recommends persons to the Sovereign for civil knighthood, and is empowered to grant certificates of Naturalisation (q. v.) to foreigners. He is the organ of communication between the cabinet and the viceregal government of Ireland, for which he is responsible, and is informed of and advises all the graver measures adopted in that country. His patronage is very considerable, including the nomination to a large number of judicial offices. Among the powers of the Secretary of State is that of committing persons on suspicion of treason, a function which, though its legality has been called in question, has been often exercised.

The Secretary of State for Foreign Affairs is the responsible adviser of the crown in all communications between the government and foreign powers. He negotiates treaties, either directly with the foreign ministers resident in the country, or through the British ministers abroad. It is his duty to inquire into the complaints of British subjects residing in foreign countries, to afford them protection, and to demand redress for their grievances. The Foreign Secretary recommends to the Sovereign all ambassadors, ministers, and consuls to represent this country abroad. He grants Passports (q. v.) to British subjects and naturalised foreigners.

The Secretary for the Colonial Department has the supervision of the laws and customs of the colonies, watches over their interests, directs their government, apportions the troops necessary for their defence or police, appoints the governors of the colonies, and sanctions or disallows the measures of the colonial governments, rarely, however, prescribing measures for their adoption.

Each of these four secretaries of state is assisted by two under secretaries of state nominated by

himself—one usually permanent, while the other is dependent on the administration in power.

The Secretary of State for India, whose office dates from the abolition, in 1858, of the double government of India by the Court of East India Directors and Board of Control, has the same control over the government of India which was formerly exercised by these bodies, and countersigns all warrants and orders under the sign-manual relating to India. He is assisted by an under-secretary, who is also a member of the legislature, and loses office with the cabinet, and by a permanent under-secretary and assistant-secretary, as also by a council of fifteen members, over whom he presides. Every order sent to India must be signed by the secretary, and all dispatches from governments and presidencies in India must be addressed to the secretary.

There is also a Chief Secretary for Ireland, resident in Dublin, except during the sitting of parliament, and under the authority of the Lord-lieutenant. His office resembles that of a secretary of state, but he is generally called Secretary to the Lord-lieutenant. He is assisted by an under-secretary.

The Secretary of State for War (see SECRETARY-AT-WAR) has the superintendence of all matters connected with the army, assisted by the commander-in-chief, and is responsible for the amount of the military establishment. He prepares for the royal signature and countersigns commissions in the army, and recommends to the sovereign for the order of Knighthood of the Bath.

SECRETION is the term employed in Physiology to designate the process of *separation* of those matters from the nutritious fluids of the body which are destined not to be directly applied to the nutrition and renovation of its organised fabric, but (1.) to be either at once removed as injurious to its welfare, or (2.) to be employed for some ulterior purpose in the chemical or physical processes of the economy itself, or to exert some kind of action upon other beings. For this definition of secretion considered as a process we are indebted to Dr Carpenter; but the reader must bear in mind that the term is also very commonly used in another sense—namely, to designate the *products* which are thus secreted. In this latter sense, it is customary to speak of the biliary, urinary, or cutaneous secretion, when the bile, urine, and sweat are indicated.

Although it is impossible to divide with strictness the secreted products (as many physiologists have attempted to do) into the *excrementitious* and the *recrementitious*—that is to say, into (1.) those which have no further function to discharge in the animal body, and which, if not excreted, would act as poisons, and (2.) those which are subservient to further uses in the system—yet we may group them according to the preponderance of their excrementitious or recrementitious character. Dr Carpenter approves of this mode of arrangement, and proposes that those secretory processes should be arranged in the first division in which the depuration of the blood is obviously the chief end, while those should be classed under the second in which the ulterior purpose of the separated fluid would seem to be the principal occasion of its production; and he further suggests a subdivision of this second group, according as this ulterior purpose is connected with the operations of the economy itself, as in the case of the tears, the saliva, the gastric juice, &c., or is destined to act on some other organism, as is the case with the secretion of the testes, the milk, &c. The organs which yield the various secretions are termed Glands (q. v.); but neither the form nor the internal arrangement of the parts of a gland have any essential connection with the nature of its product; the true process of secretion, under whatever form it may present itself, being always performed by the intervention of Cells (q. v.). For a notice of the mode in which the cells are arranged in various glandular structures, the reader is referred to the articles GLAND, LIVER, KIDNEY, MUCOUS MEMBRANE, &c.

We shall now briefly notice the causes which render the due performance of the functions of secretion essential to the well-being of every animal. 1. Nearly all the solids and fluids of the body are liable to continuous decomposition and decay in consequence of their peculiar chemical composition. There is an obvious necessity that the products of incipient decomposition should be carried off and replaced by newly-organised matter. 2. The exercise of the various animal functions is essentially destructive to the structures by which they are accomplished; every operation of the muscular or nervous system appearing to require, as a necessary condition, a disintegration or breaking up of a certain portion of their tissues, probably by an act of oxidation. Hence, for the due preservation of health, the disintegrated or effete matters must be removed, and their place supplied. 3. When more food is taken than the wants of the system require, all that is not appropriated to the reparation of the waste, or to the increase in the weight of the body, must be thrown off by the excretory organs without ever having become converted into organic tissue. If this excess were not speedily removed by the excretory organs, the current of the blood would speedily become poisoned.

The following may be regarded as a tolerably complete list of the substances which are produced within the organisms of man and the lower animals by the disintegration of its various tissues, and which are met with in one or other of the products of secretion: 1 Products of secreting processes, including *a*, the biliary acids and the products of their disintegration; *b*, the pigments of the bile; *c*, pigments allied to those of the bile and blood, viz., haematoidin and melanin; *d*, cholesterin and its allies; *e*, the sugars and allied bodies. 2. Products of the actual regressive metamorphosis of tissues—*a*, nitrogenous amide-like bodies, such as leucine, tyrosine, creatine, creatinine, allantoin, cystin, guanine, sarcine, xanthin, and urea; *b*, nitrogenous acids, as hippuric, uric, and cynuric acids; *c*, indifferent nitrogenous bodies, such as the pigments occurring in the urine; and excretine; and *d*, non-nitrogenous acids, as acetic, benzoic, butyric, carbonic, formic, lactic, oxalic, succinic, and valerianic acids. Some of these products, however, only occur in the secretions in cases of disease.

SECRETIONS, VEGETABLE. In the vegetable kingdom, the term *secretion* has a wider application than in the animal kingdom, and all substances which have been formed by the action of cells upon the compounds taken up as food (such as carbonic acid, water, and ammonia)—whether these substances form a part of the tissue of the plant, or are thrown out upon its surface—are equally considered as secretions. All the important vegetable secretions are compounds of carbon, hydrogen, oxygen, and nitrogen; sulphur being also present in some cases; and according to their functions they may be classed in two great divisions—viz., (1.) nutritive or assimilable secretions, and (2.) non-assimilable or special secretions.

1. The *nutritive* secretions are those substances which, having been formed within the plant, are used in forming its structures and constructing its general mass. The chief substances in this class are cellulose, the varieties of starch, the varieties of

sugar, the oils, and the so-called protein or albuminous bodies. The composition of these substances is extremely varied; thus, many of the volatile oils or essences contain only carbon and hydrogen; the sugars, starches and cellulose, contain carbon, hydrogen, and oxygen, and are named ternary compounds; while the protein bodies contain carbon, hydrogen, oxygen, and nitrogen, and, in some cases, sulphur.

2. The *non-assimilable* secretions are only found in certain parts of the plant, and they receive their name from their never being converted into the nutritive secretions. The principal members of this class are the colouring matter of plants (chlorophyle and its modifications); the substances which, when extracted from plants, are of service as dye-stuffs (the *chromogens* or colour-formers of recent chemists); the organic acids, which constitute a somewhat numerous group, and of which oxalic acid (occurring in rhubarb, sorrel, &c.), tartaric and racemic acids (in the grape), malic acid (in the apple and gooseberry), citric acid (in the orange, lemon, lime, and red currant), gallic acid (in the seeds of the mango), meconic acid (in the opium poppy), and tannic acid (in the bark of the oak, elm, &c.), may be taken as well-known examples; the vegetable alkalies or alkaloids, such as morphia, strychnia, quinia, &c.; the volatile oils; and the resins.

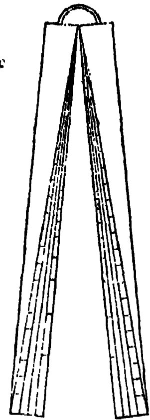
SECRET WRITING, or SYMPATHETIC INK. See INK.

SECRO'LE, a small town of Bengal, British India, three miles north-west of Benares, contains most of the civil establishments, the military cantonments, and the residences of most of the British population connected with Benares. The residences or bungalows are handsome and substantial, but are scattered about among the groves and gardens which surround the military cantonments. The latter, which are capable of containing three or four regiments, are traversed by a small stream, the Burnah Nuddee. Among the public buildings are a Christian church and chapel, a court of justice, the treasury, the jail, and a mint. S., which may be considered as the British quarter of Benares, was the headquarters of the Benares division of the Bengal army, and here, on the 4th June 1857, the 37th Bengal Native Infantry, the 13th Irregular Cavalry, and a portion of the Loodianah Sikhs, in all 2000 men, mutinied; but being charged by Colonel (afterwards Brigadier-general) Neill at the head of 240 men of the Madras and Queen's armies, and a few faithful Sikhs and Irregulars, they were compelled to take to flight with the loss of about 200 men, after killing two of their own British officers and two privates of Neill's force.

SECTION, in Architecture, the delineation of buildings on a vertical plane through any part of them—as a *plan* is the horizontal projection. Sections are of great use in practice in shewing the thickness of walls, the construction of floors, roofs, &c., and the forms and dimensions of every part of the interiors of buildings. Sections may also be used to shew the furniture, drapery, &c., of rooms. These are called furnished sections. All mouldings, cornices, &c., are drawn in section or profile, full size, for the guidance of the workmen.

SECTOR, in *Geometry*, is a portion of a circle included between two radii and the intercepted arc of the circumference. The area of a sector is equal to that of a triangle whose base is equal in length to the intercepted arc, and whose perpendicular height is equal to the length of the radius.

SECTOR, in *Practical Mechanics*, an instrument of considerable utility in rough mathematical drawing, consists of two strips of wood, ivory, or metal jointed together like a carpenter's foot-rule. It is absolutely necessary for the correctness of the instrument that the centre of the axle of the joint should be accurately at the inner corner of each slip (as shewn in the figure), so that it will always be the vertex of a triangle of which the inner edges (and consequently any of the corresponding pairs of lines drawn from the joint obliquely along the rule) form the two sides. These oblique lines, which are drawn on both sides of the instrument, and converge from the extremities of the two strips to the centre of the joint, are graduated in different ways, so as to give, on each limb, a line of equal parts, a scale of chords, scales of sines, tangents, and secants, a line of polygons, &c. (all of which are graduated from the centre of the hinge, which is their zero point), besides a number of common scales on the blank portions of the sector. The special use of this instrument is in the finding of a fourth proportional to three given quantities, and the operation is performed as follows:



Sector.

If the fourth proportional to 18, 16, and 81 is required, find the graduation indicating 18 on each limb; then obtain, by means of a pair of compasses, the length from 0 to 16, and open out the instrument till the two 18 points are as far apart as the distance given by the compasses; then, by measuring with the compasses the distance of the two graduations indicating 81, and applying the compasses to the scale, we obtain the fourth proportional required. It will be seen that this instrument merely supplies a mechanical mode of constructing two similar isosceles triangles, one of which has all its sides, and the other has only its equal sides given, the other side or base, which is formed by the sector, and read off by aid of the compasses and scale, being, from the very nature of similar triangles, the fourth proportion required. This instrument becomes more inaccurate as the angle formed by the limbs increases. The sector is said to have been invented by Guido Ubaldi about 1568, though Gaspar Mordente of Antwerp describes it in 1584, and attributes its invention to his brother Fabricius in 1554. It was described by several German and English writers in the same century, and again by Galileo, who claimed to have invented it in 1604.

SE'CULAR CLERGY. See REGULAR CLERGY.

SE'CULARISM is the term applied to a system of ethical principles begun to be advocated about 1846 by G. J. Holyoake. As the system has a considerable number of adherents, and comes not seldom into public notice, a brief account of its leading doctrines is here given. As in similar cases, we allow a believer in the doctrines to speak for himself.

The Secular is defined as that which pertains to this life, and is treated as a thing apart; as independent of, rather than as necessarily opposed to, any other mode of thought and duty. Secularism, as regards opponents, claims that to ignore is not to deny. As the geometrician ignores chemistry or metaphysics, without a thought of denying them, so secularism, which concerns itself with this world, refuses to be held as conflicting with that 'other-worldliness,' which, if demonstrable, must be based on an experience to which secularism makes

no pretension, and towards which it considers itself to incur no responsibility. Secularism commences by laying down the proposition that intelligent sincerity is sinless. It does not maintain that even intelligent sincerity is errorless, but that it is without conscious guilt, even when it is, as it may be, dangerously mistaken. The conscience thus educated, Thought may be intrusted to inquire, and the search for Truth may be begun.

Secularism takes the term Free Thought as expressing the central idea which it inculcates. It defines Free Thought as the unrestricted application of the powers of the intellect to any subject—the absence of any threat or penalty, legal, spiritual, or social, for the exercise of thought. The Free Thought it inculcates is not lawless thought; it is guided by methods of logic, limited by evidence checked at every step by experience, which is omnipresent, and corrected by the results of science. Free Thought is not the rebellion, but the judicial action of the understanding. Reason—the faculty of following the pathway of facts—does not despise intuition, nor instinct, nor the voice of nature, nor authority; it uses, but revises them; it does not pretend to be infallible, but to be the best arbiter we have. To the conception of Free Thought is also necessary the Free Publication of Opinion; for no one could profit by the thought of other minds unless it was freely communicated. Hence the diffusion of thought becomes an obligation on each thinker, and silence or supineness a social crime. Again, Free Thought that would command respect must be submitted to Free Criticism. Thought is often foolish, often mischievous, and sometimes wicked, and he alone who submits it to free criticism gives guarantees to society that he means well, since by criticism comes the exposure of false or foolish opinions; and the right of criticism is the sole protection of the public from error. Free Thought must end in the Free Action of opinion, since he thinks to no purpose whose thought is inapplicable to conduct; and he withholds the sign of his own sincerity who does not unite his thought with action. Such is that education in Free Thought which secularism attempts.

It holds that Scepticism is the pathway to affirmative truth. So far from being a crime scepticism is scrutiny. So far from being [illegible] error, it is the beginning of inquiry—the first condition for the recognition of unknown truth. He who would be master of his own mind, and know what is in it, and who would have no principles there but those which are pure, true, and reliable, must refuse to believe anything until he is compelled to believe it; it being no more safe to keep one's mind open to all notions, than to keep one's door open to all comers. It is clear that the use of Free Thought may be a nuisance, a terror, or an outrage, unless Courtesy takes care of it. Therefore secularism provides that advocacy shall be directed to the exposure of error and the elucidation of truth, without moral imputation upon those whose opinions are controverted; and contends that all advocacy, wanting in consideration towards others, shall be regarded as a crime against Free Thought. The quality of the thought, and not the motive of it, is the proper and sufficient subject of discussion.

Secularism further imposes upon the action of Free Thought the limit that every one shall concede to others the liberty he claims for himself, and shall permit to others, and shall recognise in each individual, 'liberty of action in all things by which others are neither injured nor damaged.' Secularism, regarding the one object of all Free Thought as the attainment of truth, finds in the study of nature its immediate sphere of exercise. Free Thought is prompted by a desire to fathom the knowable; and nature and human life are the immediate sources of truth and duty, which it most concerns man to master. Therefore respect for this life, respect for pure physical conditions, respect for the moral capacity of human nature, are conditions of secular belief. Secularism is not committed to denying that there is other good—it does not meddle with that question; it says whether there be other good or not, the good of the present life is good, and it is good to seek that good. It holds that the secular is sacred, and seeks 'to find that material condition in which it shall be impossible for man to be depraved or poor.' It does not say that all things are material, or that there are no spiritual agencies; it does not enter upon these propositions, but confines itself to shewing that there are material agencies in this life, whatever else there may be, and that these, as far as they can be discovered, are the calculable forces of the world, which cannot be neglected without folly or hurt, and that it is wisdom, mercy, and duty to attend to them. Without entering upon the question of the interference of Providence, secularism contends that Science is practically the providence of life; that conscience is higher than consequence; that deliverance from calamity is more merciful than any system of consolation which only acts when calamity has occurred; and that it is not the pursuit of happiness, but the performance of duty, which is the end of life. Secularism proceeds in the path of Positive Philosophy, not seeking for errors but for truth; not busying itself with negations, but with affirmations. In sacred writ it seeks for guiding truth and thought which commends itself to reason and experience, accepting the intrinsically true, without entering upon the vexed questions of inspiration or authenticity. Whatever principles secularism inculcates, they are affirmative in their nature, relate to the welfare of humanity, and are determined by considerations purely human.

There is unquestionably a vast outlying class in every European country, and especially in our Indian territories, who are without the pale of Christianity. They reject it, they dislike it, or they do not understand it. Secularism is intended for these, and for all who find theology indefinite, or inadequate, or deem it unreliable. The object of secularism is to afford these classes a knowledge of principles addressed to their common reason and intelligence, by an appeal to principles of a secular nature, common to humanity in every state and clime. It may be a misfortune that the principles of theism, or the acceptance of the Bible, cannot be rendered promptly acceptable to them. Since, however, this is not the case, it must be of advantage to interest them in rules calculated for the moral guidance of their conduct. Upon these Christianity may be, if shewn to be tenable, subsequently superinduced. The principles of secularism are intended to constitute an education of the working-classes, which begins with their reason, grows with their intelligence, and ends only with death.

Secularism is not an argument against Christianity, it is one independent of it. It does not question the pretensions of Christianity; it advances others. Secularism does not say there is no light or guidance elsewhere, but maintains that there is light and guidance in secular truth, whose conditions and sanctions exist independently, act independently, and act for ever. Secular knowledge is manifestly that kind of knowledge which is founded in this life, which relates to the conduct of this life, conduces to the welfare of this life, and is capable of being tested by the experience of this life. Geometry, Algebra, Botany, Chemistry, Navigation, Political Economy, Ethics, are secular subjects of

instruction (distinct albeit from secularism which includes the education of the conscience). They are founded in nature, they relate to the uses of this life, promote the enjoyment of this life, and can be tested by personal experience. That which is secular can be tested in time; that which is theological is only provable after death. If a sum in arithmetic is wrong, it can be proved by a new way of working it; if a medical recipe is wrong, the effect is discoverable on the health; if a political law is wrong, it is sooner or later apparent in the disaster it brings with it; if a theorem in navigation is erroneous, delay or shipwreck warns the mariner of the mistake; if an insane moralist teaches that adherence to the truth is wrong, men can try the effects of lying, when the disgrace and distrust which ensue soon convince them of the fallacy; but if a theological belief is wrong, we must die to find it out.

The standard of secularism is utilitarian. Utility is made the test of right, not the utility which is sensual and selfish, but that which takes into account the highest attributes and noblest aspirations of humanity (see UTILITARIANISM). It is not the agent's own happiness, but the happiness of others which the utilitarian is bound to promote. The adoption of this rule makes intelligence a necessity. Secularism is not sceptical. It seeks everywhere positive truth, and regards doubt as a difficulty and a danger. It is not infidel, for that is a state of mind treacherous to the truth, and truth is the first thing to which secularism teaches allegiance. It is not atheistic, atheism being alien to secularism, which concerns itself with the affirmative. Secularism might call itself religious, if it were allowable to use the term without including some distinctive theory of theism, which is equally excluded from the subject-matter of secularism, as not coming within the region of positive knowledge. Nothing in secular morals can be insisted upon with effect, save those statements which appeal to the common experience, and with which you can dare the judgment of mankind; but if that may be called religious, which appeals to demonstrative intelligence, which addresses itself to the conscience, which inculcates love, and truth, and justice; which claims service and endurance from all men; which places happiness in duty, and makes the service of humanity the one object of life, and the source of consolation in death, then secularism may be so defined, and in this sense it has been described in the following definitions:

Secularism is the religion of the present life: it teaches men to seek morality in nature, and happiness in duty; guiding the conduct and educating the conscience of those who do not know, or who, from conscientious conviction, stand apart from Christianity. Secularism teaches a man to acquit himself well in this world as the purest act of worship, to study the truth, to judge by reason, to regulate human interests by considerations purely human, and to act on that rule of utility which conduces to the greatest good of others; thus endeavouring to deserve another life by the unhasting, unresting pursuit of duty in this.

SECUNDERÁBA'D (more correctly Sikandarábád), a large town, and an important British military cantonment in the Nizam's Dominions, India, six miles north of Haidarábád. On the north-east are two singular granite hills, large, hemispherical in shape, completely isolated, and having on their summits the tombs of Fakirs, which are visited by a great number of pilgrims each year. The cantonment consists of a curved, irregular street, three miles in length, with the officers' houses ranged on either side. There are numerous barracks, and good hospital accommodation. There are numerous tanks in the vicinity, and the water is good. The mean annual temperature is 81° 30′, and the climate is unhealthy—though less so now than formerly—during the rainy season. Pop. of S., 40,000.

SECURITY, in Law, means some deed or instrument affecting real or personal estate, the object of which is to secure the payment of money or other primary debt or obligation. Such are Bonds (q. v.) and Mortgages (q. v.). See also HERITABLE SECURITIES.

SEDAN, an ancient, manufacturing town of France, in the dep. of Ardennes, and a frontier fortress of the third rank, on the right bank of the Meuse, 163 miles by railway north-east of Paris. The cloth manufacture employs a large portion of the population, which amounted, in 1862, to 13,441. S., which played an important part in the civil wars, was ceded to Louis XIV., by the Duke of Bouillon, in 1642, and four years after Colbert founded here the first cloth factories.

SEDA'N CHAIR, a portable covered vehicle for carrying a single person, borne on two poles by two men. The name is derived from the town of Sedan, in the north of France, where this species of conveyance is said to have been invented. It is said that the Duke of Buckingham was in the practice of using one in the reign of James I., a proceeding which gave general offence, it being made matter of public remark, that this royal favourite used his fellow-countrymen to do the work of beasts. The general introduction of sedan chairs into England dates from 1634, about the same period that hackney coaches came into use. Sedan chairs were largely used during the greater part of last century, being found very well adapted for transporting persons, in full dress, to public and private entertainments. Not only were there numerous public conveyances of this kind in London and all considerable towns, but the owner of every large mansion had his private sedan handsomely fitted up. In Edinburgh, a century ago, sedan chairs were far more numerous than hackney coaches, and were almost all in the hands of Highlanders. Sedans are now seldom seen except for the transport of the sick.

SE'DATIVES are medicines which exert a direct or primary depressing action upon the vital powers, without inducing any subsequent excitement. The diseases in which sedatives are employed are chiefly those of over excitement of the nervous and circulating systems; and as some of the members of this class (hemlock, for example) act directly on the nervous system, while others (foxglove, for example) more immediately act upon the heart, it is necessary to be able to determine the kind of sedative suitable for each individual case. Inflammatory fever presents all the conditions in which sedatives are likely to be of service. 'The excited heart, elevated temperature, hard and unyielding pulse, and the disordered state of the special nerves, call for the administration of remedies fitted to appease their excited energy, and the great improvement which, in such a case, follows the use of *blood-letting, tartar emetic*, and *digitalis*, bears evidence to the correctness of our practice.' (Ballard and Garrod's *Elements of Materia Medica*, p. 11.) The following are the most important members of this class, aconite, carbonic acid (applied locally in cases of irritable bladder or womb, or to painful ulcers), chloroform (especially when inhaled), conium, digitalis, hydrocyanic acid, and tobacco.

SEDGE. See CAREX.

SEDGWICK, an American family, distinguished in politics, law, and literature.—THEODORE S.,

statesman and jurist, was born at Hartford, Connecticut, May 1746. He was descended from Robert Sedgwick, a major-general of the army of Cromwell. Educated at Yale College, he adopted the profession of law, and removed to the western part of Massachusetts, where he was a member of the Colonial Assembly. Though a loyalist in feeling at the outbreak of the American revolution, he took the part of his country, and served as an aide-de-camp to General Thomas in the unfortunate expedition to Canada. In 1785, he settled at Stockbridge, Massachusetts, where his descendants now reside, became a member of the Continental Congress, and took an active part in suppressing Shay's rebellion. He remained in congress as representative or senator until 1799, and in 1802 was appointed judge of the Supreme Court of Massachusetts, and was a prominent member of the old Federalist party, and an early opponent of slavery. He died at Boston, January 24, 1813.—THEODORE S., American lawyer and writer, son of the preceding, was born at Sheffield, Massachusetts, December 1780. Like his father he was bred to the legal profession, and in 1801 settled at Albany, New York, where he remained in successful practice until 1821, when he retired to Stockbridge, advocating, as a popular speaker, the interests of a scientific agriculture, free trade, temperance, and anti-slavery, and wrote *Public and Private Economy, illustrated by observations made in Europe in* 1836—1837 (3 vols., 12mo, New York, 1838). He died of a stroke of paralysis, after making a public speech at Pittsfield, Massachusetts, November 7, 1839.—SUSAN RIDLEY S., wife of the preceding, descended from an old English Border family, and proud of her relationship to Bishop Ridley, was a daughter of William Livingston, governor of New Jersey. She is the author of *The Morals of Pleasure* (1829); *The Young Emigrants*, and *The Children's Week* (1830); *Allan Prescott*, a novel (1834); *Alida* (1844); and *Walter Thornly*, a novel, written in 1859, when she was more than 70 years old. She resides on the family estate at Stockbridge.—CATHERINE MARIA S., American authoress, daughter of Judge Theodore Sedgwick, was born at Stockbridge, near the close of the 18th century. In 1822, she published *A New England Tale*, which was followed, in 18[illegible] by *Redwood*, a novel, so popular that it was reprinted in England, and translated into several of the continental languages. This was followed by *Hope Leslie, or Early Times in America* (1827); *Clarence, a Tale of our Own Times* (1830); *Le Bossu* and *The Linwoods* (1835); and these by a series of popular stories, illustrating morals and domestic economy, entitled *The Poor Rich Man and the Rich Poor Man, Live and Let Live, Means and Ends, Home*, &c.; and contributed a 'Life of Lucritia Maria Davidson,' to Sparks's *American Biographies*. In 1841, on her return from Europe, she published *Letters from Abroad to Kindred at Home;* in 1845, *Wilton Harvey and other Tales;* followed by *The Morals of Manners*, and *Married and Single*. She also edited, and was an active contributor to some of the leading American periodicals. Died July 31, 1867.—THEODORE S., an American lawyer, son of the second Theodore S., was born at Albany, January 27, 1811, was educated at Columbia College, and admitted to the bar in 1833; and excepting three years spent at Paris, as secretary of the American legation, continued in successful legal practice until 1850, when he again visited and made an extensive tour in Europe. He steadily declined to engage in politics, and refused all offices tendered him, until, in 1858, he accepted that of United States attorney for the southern district of New York. Among his writings are, a standard *Treatise on the Measure of Damages*; a work on *The Interpretation and Application of Statutory and Constitutional Law;* the *Memoirs of William Livingston*, his grandfather; *The Life and Works of William Leggett*, and various occasional addresses. He died at Stockbridge, December 9, 1859.

SEDI'TION (Lat. *seditio*, from *se*, apart, and *ire*, to go), a general name given to such offences against the state as fall short of treason. In the law of England, it is not a strictly technical word. Writing, publishing, or uttering words tending to excite subjects to insurrection, though not urging them to rebellion or total subversion of the government, come under this denomination. There are various English statutes (as 39 Geo. III., c. 79; 57 Geo. III., c. 19; and 60 Geo. III. and 1 Geo. IV., c. 8) directed against particular acts of sedition, such as seditious libels, and seditious meetings or assemblies, which are punishable as misdemeanours. Act 36 Geo. III., directed against all seditious practices and attempts tending to high treason, is extended to Ireland by 11 Vict., and additional provisions are added to it. By this latter act, the compassing or devising, either to depose the Queen; to levy war against the Queen, for the purpose of changing her Majesty's measures, or constraining or overawing parliament; or to move any foreigner to invade the Queen's dominions, is made felony, punishable by transportation for life, or for a period not less than seven years, and that even though the facts should amount to treason.

In Scotland, sedition is distinguished from Leasing-making (q. v.), in so far as the object of the latter is to disparage the private character of the sovereign, while the former crime is directed against the order and tranquillity of the state. The punishment of sedition, formerly arbitrary, is now restricted to fine and imprisonment.

SEDU'CTION, in point of law, is the taking of an unmarried woman's chastity without marriage, and under circumstances of fraud. It is not a criminal offence unless violence is used, and resistance overcome, or the age of the female is under 21, in which cases the offence is Rape (q. v.) or Abduction (q. v.). In England, where no force has been used, no action at law can be maintained by the female seduced, however deceitfully the man may have acted. But if the female is a servant, either to her father or mother or a third party, then the master or mistress can sue the seducer, provided any loss of service has been caused by the seduction, such as her absence when lying-in of a child. Though, strictly speaking, the damages recovered by the master or mistress, in such a case, should be measured solely by the pecuniary value of the services lost, yet it is an inveterate practice for juries to give damages greatly beyond that amount, especially where the father or mother sues, and the conduct of the man has been base and heartless. In Scotland, the woman can sue in her own right for damages if deceit has been used, but the difficulty of establishing that the deceit was the sole cause of the injury, prevents such actions from being common. The remedy there more frequently resolves itself into an action for breach of promise of marriage, or for declarator of marriage, or for filiation and aliment.

SE'DUM, a genus of plants of the natural order *Crassulaceæ*, having the calyx in 4—8 (usually 5) deep segments, which often resemble the leaves, the same number of spreading petals, twice as many stamens, and 4—8 (usually 5) germens, each with a nectariferous scale at the base. The species are numerous, with succulent, often roundish, leaves; and pretty, star-like flowers. Many of them grow on rocks, whence the English name STONE-CROP. They are natives of the temperate and

cold parts of the northern hemisphere; some are British. They have no important uses; some are refrigerant, others are acrid. Among the British species is *S. Telephium*, popularly called ORPINE, sometimes used as a diuretic; and *S. acre*, the most common, whose brilliant yellow flowers adorn the tops of old walls, the débris around quarries, &c.

SEE (Lat. *sedes*, a seat), in ecclesiastical use, properly signifies the seat or chair (*cathedra*), sometimes also called 'throne,' of a bishop. Popularly, however, and indeed by universal usage, it is employed to designate the city, and thence, at least in popular language, the entire diocese, in which the seat of the bishop is placed, and over which, consequently, his episcopal jurisdiction extends. Sees have always been fixed, at least in their primitive establishments, in some city or considerable town; and it is to be observed that the name of a see is always taken not from the district governed by the bishop, but from the city or town. Sees *In Partibus Infidelium* (q. v.) still retain their ancient names, although in very many cases not merely the cities themselves, but even all traces of the Christian religion, in the sites upon which they anciently stood, have disappeared. In the Roman Church, the pope alone establishes sees, and alters their distribution and their local limits and boundaries; but these changes are not made except in extreme cases (such as that of the French Revolution) without the consent of the actual bishop. In the Anglican Church, this is done by the authority of the legislature.

SEED, in Phanerogamous Plants, that part which may in some measure be regarded as corresponding to the perfectly developed impregnated *ovum* of animals, and which is the utmost effort made by the plant for the reproduction of its species. It is the perfectly developed Ovule (q. v.). Whilst one cell of the interior of the nucleus (see OVULE) greatly enlarges, the other cells are forced back; the interior of the nucleus thus becomes a cavity (the embryo sac), and Fecundation (q. v.) now taking place by means of the pollen, the primary cell is formed, which grows to form the *embryo*. As the fertilised ovule is developed into the ripe seed, the *foramen* (see OVULE) or *micropyle* closes completely; but its place is commonly marked in ripe seeds by a little cicatrix. In the ripe seed, the integuments of the ovule, more fully developed, form the covering (*spermoderm*); whilst the *nucleus* is either entirely converted into the Embryo (q. v.), or also into an unorganic cellular mass called the Albumen (q. v.), which is, in an economical point of view, the most important part of many seeds, as of those of the cereal grasses. The embryo, which with respect to the reproduction of the plant, is the most essential part of the seed, is developed to various degree in different plants—which is also the case in different animals, and even in those of the same class, as in mammalia; but in general, the *radicle* may be distinguished in it—the beginning of the root or descending axis of the new plant, and the *plumule* or *gemmule*—the beginning of the stem or ascending axis, as well as the *cotyledon* or cotyledons, provided for the nourishment of the new plant in its youngest stage. When the embryo is accompanied with albumen, it is sometimes completely enclosed in it; sometimes it lies at the side of the albumen; and sometimes it surrounds the albumen like a ring, or even completely. Sometimes, but rarely, the embryo is not well developed in ripe seeds, so that its parts cannot be distinguished, as in the *Orchideæ*, in which it appears as a roundish or oval, uniform, little cellular mass. In germination, the embryo breaks through the covering of the seed, and develops itself into the new plant.

Seeds are either *sessile* or *stalked*. The stalk is of various length, and is formed of the *funiculus* or *umbilical cord*; the place at the base of the seed, by which it is affixed to the inside of the fruit, or to the end of the *funiculus*, being called the *Umbilicus* or *Hilum*. When the seed is perfectly ripe, it has no further need of connection with the parent plant, and the *funiculus* dries up, leaving the *hilum* a mere scar.

Besides being enclosed in a capsule, or in a succulent fruit, &c., the most essential parts of the seed have coverings of their own, which are reckoned as belonging to the seed itself. Its general covering is called the *spermoderm* (Gr. *sperma*, seed, *derma*, covering), which consists of an external membrane, the *testa* (Gr. shell) or *episperm* (Gr. *epi*, upon) and an internal membrane, the *endopleura* (Gr. *endon*, within, *pleura*, side). Sometimes there is within the episperm a fleshy layer, called the *sarcosperm* (Gr. *sarx*, flesh). The Aril (q. v.) is a comparatively rare additional covering.

The seeds of phanerogamous plants afford characters which distinguish two great classes as *Monocotyledonous* and *Dicotyledonous* (see COTYLEDON). Very few plants have more than two cotyledons (seed-lobes). It is the case, however, with some of the *Coniferæ*. Cryptogamous plants are also designated *Acotyledonous*, as having no seed-lobes; and the name *Spore* (q. v.) is distinctively given to their seeds.

Seeds retain their vitality very long; but the time seems to be very various with the seeds of different plants, and in different circumstances. The grains, or seeds of cereal grasses, are probably excelled in this respect by none; grains of maize found in the tombs of the Incas have been made to vegetate; and also, it is said, grains of wheat taken from Egyptian mummies, although of this there is some doubt. After the great fire of London in 1666, plants not previously common sprang up abundantly on the waste ground; certain plants previously unknown there are sure to appear after a fire in the American forests; and instances are constantly occurring of a deep trenching of land or a turning up of soil by railway or other operations, producing a crop of some kind of plant previously unknown or rare in the locality. Thus the writer of this article has seen plants of the Milk Thistle appear on rubbish thrown out from the foundation of a house in Peeblesshire, where there was no other Milk Thistle in the neighbourhood. And in Paisley Moss, in Renfrewshire, willows spring up in the ditches which are cut for drainage, from the surface of the soil which underlies the moss or peat. It is difficult to conjecture how long the seeds, in such cases, may have retained their vitality.

Exposed to the air, however, seeds generally lose their vitality in a few years. Some kinds retain it much longer than others. Seeds which abound in fixed oil seem to lose it more quickly than others.

In conveying seeds from one part of the world to another, and through great diversities of climate, it is desirable to have them as closely secured from the air as possible. But it has been found that of seeds brought from the Botanic Garden at Calcutta to Scotland, round the Cape of Good Hope, with no other care than would be used in sending a parcel from a seed-shop to a neighbouring garden, the greater part readily vegetated.

SEE'LAND (Dan. *Själland*), the largest and most important island of Denmark, lies between the Cattegat and the Baltic, and is separated by the Sound from Sweden, and by the Great Belt from Fünen. Length, 78 miles; extreme breadth, 70 miles;

area, 2672 sq. m.; pop. in 1860 (including the pop. of Möen, which contains 15,000 inhabitants), 574,811. The surface is almost flat; the coasts, which are rock-bound on the south-east, are indented by bays and fiords, the chief of which is the Roeskilde-Isefiord in the north. The rivers are small, the largest being only 50 miles long; there are several lakes, and all the waters abound in fish. The island contains several beech-forests, is exceedingly fruitful in corn, and breeds excellent horses and cattle. Agriculture and cattle-breeding are the principal employments of the inhabitants. The chief place is Copenhagen (q. v.), the capital of the country, on the east coast, and from this city, lines of railway traverse the island to Elsinore in the north, and to Korsör in the south-west, on the coast.

SEER. See PROPHET.

SE'GGAR, a vessel used by potters to protect delicate articles from the too fierce action of the fire in the kiln. See POTTERY.

SE'GMENT (Lat. *segmentum*, a part cut off) is, in Geometry, a portion cut off from a circle by a line, or from a sphere by a plane. When the angle subtended at the centre of a circle by the segment, and the radius, or when the chord of the segment and its height, are known, the length of the arc of the segment and its area can be determined with as much accuracy as the circumference and area of the whole circle. See SPHERE.

SE'GNO (Ital. sign), a word used in musical notation in connection with marks of repetition. When a part is to be repeated, not from the beginning, but from some other point, the mark :𝄋: is placed over the point where the repetition is to commence, and the words *Dal Segno* (or *d. s.*) are written at the close of the part to be repeated.

SE'GO, an important town of Western Africa, capital of the state of Bambarra, stands on the Niger, here called the Joliba, in lat. 13° 5′ N., long. 7° W. Its streets, which are winding, have a breadth of from 24 to 26 feet, and are extremely clean. The palace of the king is large enough to accommodate 2000 men and 500 horses. The houses are built of clay, and are flat-roofed, and the royal residence differs from the other dwellings only in size. The country in the vicinity is well cultivated, and the town is the seat of considerable traffic. Mungo Park, from whom we derive almost all the knowledge we possess of S., here first beheld the Joliba. Pop. estimated at 30,000.

SEGO'RBÉ, a small town of Spain, in the modern province of Castellon, on the right bank of the Palancia, in a valley renowned for the beauty of its scenery and for its amazing fertility, 20 miles north-west of Murviedro. It stands on a hill between two castles, and contains stately houses, numerous churches, and a cathedral. Brandy-distilling is carried on to a great extent, and there are flour and paper mills. Pop. 6200.

SEGO'VIA, an interesting city of Spain, capital of the modern province of the same name (see CASTILE), stands on the Eresma, by which it is nearly encircled, 47 miles north-north-west of Madrid. It occupies the top of a rocky knoll, 3300 feet above sea-level, is surrounded by picturesque walls with round towers, and consists of narrow uneven streets, with old, quaint, and stately houses, 24 parish churches, and 21 convents. The Alcazar, or castle, is perched on the west extremity of the rocky height, and was originally Moorish, but repaired magnificently in 1452—1458. The cathedral of S., a noble specimen of florid Gothic, is one of the finest in Spain. The present building was begun in 1525. The square cupola-crowned tower is 330 feet high, and the prospect from this elevation is superb. The grand aqueduct of S., supposed to have been built in the time of Trajan, is believed to be the most important Roman structure in Spain. It consists of two rows of arches, the one resting upon the other, from 2500 to 3000 feet in length, and 102 feet high. There is a mint here for coining copper money. Wool-scouring and the manufacture of woollen fabrics are languidly carried on. Pop. 10,339.

S. was a place of importance during the time of the Romans; was the seat of immense cloth-manufactures in the time of the Moors, and was frequently the residence of the kings of Castile and Leon. Charles I. of England lodged at the Alcazar, September 13, 1623, and supped on 'certaine trouts of extraordinary greatnesse.' The unresisting town was entered in 1808 by the French, under Frere, and completely sacked.

SEGUR, the name of a French family, distinguished both in arms and letters. It is of Limousin origin, and was known there, it is said, as far back as the 9th century. The first, however, that specially merits notice was HENRI FRANÇOIS, Comte de S. (born 1689, died 1751), an able French general in the war of the Austrian Succession. His son, PHILIPPE HENRI, Marquis de S. (born 1724, died 1801), fought in the Seven Years' War, obtained the dignity of *Maréchal de France* in 1783, and outlived in his retirement the stormy scenes of the Revolution. The eldest son of this Philippe Henri was LOUIS PHILIPPE, Comte de S. (born 1753, died 1830), a vivid dashing sort of man, for some years ambassador at the court of St Petersburg, and a great favourite with Catharine II. Of impressionable fancy, full of enthusiasm for the 'philosophers,' the 'reign of reason,' and the 'new ideas' generally, he hailed the great Revolution with delight, but took no prominent part in it. His public career during the Empire was respectable, but not brilliant; but one notices with satisfaction that he retained in extreme old age that love of liberty that marked his early years; the last act of his life being an eulogium on the revolution of July. As a writer, S. has in wonderful perfection the national graces of style and spirit. Among his numerous writings are *Pensées Politiques* (Par. 1795), *Histoire de Frédéric Guillaume II.* (Par. 1800), *Contes, Fables, Chansons et Vers* (Par. 1801), and *Mémoires ou Souvenirs et Anecdotes* (Par. 1824). He left two sons, OCTAVE and PAUL PHILIPPE, the latter of whom (born in 1780) was a general of the First Empire, took part in the fatal expedition to Russia in 1812, and has written the story of the campaign, *Histoire de Napoléon et de la Grande Armée pendant l'année* 1812 (Par. 2 vols., 1824). The work has had an immense success, is now in its 15th edition, and has been translated into almost all the languages of Europe. Other works of the Comte Paul Philippe de S. are: *Lettre sur la Campagne du Général Macdonald dans les Grisons* (Par. 1802), *Histoire de Russie et de Pierre le Grand* (Par. 1829), *Histoire de Charles VIII., Roi de France* (Par. 1834); &c.

SEGU'RA, a river in the south-east of Spain, rises in the Sierra Seca, and after an east-south-east course of about 180 miles, enters the Mediterranean 27 miles below Orihuela. Ships unload at its mouth.

SEI'DLITZ POWDERS are composed of 120 grains of tartrate of soda and potash, and 40 grains of bicarbonate of soda reduced to powder, mixed and enclosed in a blue paper, and 35 grains of powdered tartaric acid in a white paper. The contents of the blue paper are dissolved in from half a tumbler to a

tumbler of water, and those of the white paper are then stirred in. The mixture should be taken while the effervescence from the liberation of the carbonic acid is still going on. These powders act as an agreeable and mild cooling aperient. If a stronger dose is required, either an increased quantity of the powder may be used, or a little sulphate of magnesia (about a drachm) may be added.

SEI'GNIOR, Grand, a name sometimes given to the Sultan (q. v.) of Turkey.

SEINE, the metropolitan dep. of France, completely enclosed by the dep. of Seine-et-Oise, is a portion of the former province of L'Ile-de-France, and derives its name from that of its principal river (see Seine, river). It is at once the smallest and the most populous dep. in the empire; its area is 183 sq. m.; its pop. (1862) 1,953,660, or 10,675 to the sq. mile. From south-east to north-west, the dep. is traversed a distance of 37 miles by the winding Seine, which receives the navigable Marne at Charenton, and the Bièvre at Paris. The surface is marked by undulations and low hills, the highest of which, Mont-Valérien, is only 446 feet above sea-level. The climate is pleasant and healthy. The scenery—of which the woods of Verrières, Meudon, and Saint-Cloud, together with those of Vincennes and Boulogne, transformed into parks, and watered by artificial rivers and lakes, are perhaps the most striking features—is remarkably pleasing. A network of canals and railways, the latter converging in the capital, afford easy means of transit in any direction. The soil is calcareous, and in the greater part, naturally infertile, but, owing to the skill of the farmers and gardeners, who obtain abundant supplies of manure from the metropolis, the country around Paris (q. v.) and its suburbs has been rendered remarkably productive. The culture of vegetables and fruits for the markets of Paris is one of the most important branches of husbandry. Enormous quantities of mushrooms are cultivated in the ancient quarries of Paris near Montrouge. Quarries abound, and are productive.

SEINE (anc. *Sequana*), one of the most important rivers of France, rises near Mont Tasselot, in the middle of the dep. of Côte-d'Or, and after leaving the northern boundary of that dep., flows west-north-west through the deps. of Aube, Seine-et-Marne, Seine, Seine-et-Oise, Eure, and Seine-Inférieure, to the English Channel, which it reaches at Havre, after a course of 470 miles. It passes the towns of Troyes, Méry- where, 350 miles from its mouth, it becomes navigable—Corbeil, Paris, Elbeuf, Rouen, and Havre. The source of the river is about 1420 feet above the level of the sea; but below Paris its current is slow, and its course to Rouen is marked by numerous windings. Its lower course also is banked by steep hills, which, while they are picturesque, are everywhere cultivated. The principal affluents are, from the right, the Aube, Marne, and Oise; from the left, the Yonne, Loing, Essone, and Eure.

SEINE-ET-MARNE, an inland dep. in the north of France, is bounded on the E. by the dep. of Seine-et-Oise, and forms a portion of that wide basin in the middle of which stands Paris. Area, 2214 sq. m.; pop. (1862) 352,312. The dep. owes its name to the two chief streams that water it, and of which the Seine flows through the southern, and the Marne through the northern part. There are no mountains, but ridges of low hills separate the fertile and extensive though not deep valleys. Timber is grown in every part; and among the forests is that of Fontainebleau. The soil is generally fertile. Of cereals, wheat is the principal crop. Vegetables and fruits are also largely grown, and the meadows and pastures, natural and artificial, are extensive and productive. The wines are mediocre in quality, but the grapes for the table, called the *Chasselas de Fontainebleau*, have a European reputation. The capital is Melun, and the arrondissements are Melun, Coulommiers, Fontainebleau, Meaux, and Provins.

SEINE-ET-OISE, a dep. in the north of France, encloses the metropolitan dep. of Seine (q. v.). Area, 2163 sq. m.; pop. (1862) 513,073. The great rivers are the Seine and Oise, which have numerous affluents. Extensive plains occupy the southern districts; but in the north, the country is much broken, and picturesque valleys and great forests occur. The soil is not in general very fertile; but owing to the vicinity of the capital the amount of produce is great. Among the minerals, are several fine varieties of stone and fine clays. In addition to the usual branches of manufacture, porcelain is largely made at the famous Sèvres (q. v.) factories. The dep. is divided into the arrondissements of Versailles, Corbeil, Étampes, Mantes, Pontoise, and Rambouillet, and the cap. is Versailles.

SEINE-INFÉRIEURE, a maritime dep. of France, bounded on the north-west by the English Channel, and on the south by the dep. of Eure. Area, 2328 sq. m.; pop. (1862) 789,988. The Seine flows through the southern districts; but a number of important though small streams flow north-west across the dep., and fall into the Channel. The range of the hills of Caux extends from east to west, and to the south of it are rich pasture-lands, watered by the Seine and its affluents. Husbandry flourishes chiefly in the middle and in the east districts. The coasts are formed of chalk-cliffs, varying in height from 200 to 650 feet. The arrondissements are Rouen, Neufchâtel, and Yvetot. The capital is Rouen, which communicates with Dieppe by a direct line of railway.

SEIR-FISH (*Cybium guttatum*), a fish of the family *Scomberidæ*, having finlets, and the sides of the tail keeled, the teeth compressed and sharp. It inhabits the seas of the East Indies, and is one of their most valuable fishes. In size and form, it is very similar to the salmon, which its flesh resembles also in firmness and flavour, although of a white colour.

SEI'SIN. See Sasine.

SEISTA'N or HAMOON LAKE (anc. *Aria Palus*), a large, irregularly-shaped, shallow lake of Afghanistan, bordered with plantations of tamarisk and other trees, and enclosed by the province of Seistan. It is 25 parasangs (a parasang = 3·45 English miles) in length, and it varies from 6 to 12 parasangs in breadth. In most written accounts and maps, the form and position of the lake are inaccurately given. General Ferrier, perhaps, the most recent explorer in this region, says that the lake is in lat. about 31°—32° N., and that it follows an oblique line, starting in the north at long. 60°, and terminating in the south in long. 59° E. Of the rivers which feed the lake, none, except the Helmund, contribute any waters during the summer, as in that season they are diverted and employed in the irrigation of the land. The lake, which has no outlet, overflows its boundaries, like the rivers which feed it, and irrigates and fertilises large tracts of country. It is only from four to five feet deep, and is gradually becoming shallower. Its waters, though not salt, are black, and disagreeable to the taste. The name Seistan is a corruption of Saghistan—i. e., the country of the saghis, a kind of wood which grows here in abundance, and

is largely used as fuel.—See Ferrier's *Caravan Travels* (Lond. Murray, 1856).

SE'JANT, or ASSIS (Fr.), in Heraldry, is the term of blazon applied to a beast in his usual sitting posture. A lion borne in full face, with his fore-paws extended sideways, is blazoned sejant affronté, as in the crest of Scotland.



Sejant affronté.

SEJA'NUS. See TIBERIUS.

SE'LBY, a market-town and river-port in the West Riding of Yorkshire, on the right bank of the Ouse, 12 miles south of York by railway. The ancient Gothic cross which adorns the market-place, and the character of the architecture of the houses, attest the age of the town. The magnificent parish church, 300 feet long by 60 feet wide, is part of an abbey founded by the Conqueror in 1068. The movable bridge across the river offers a passage to shipping, and the river is navigable to S. for vessels of 200 tons. Means of communication by railway and canal are abundant. There are iron and brass foundries, and slips for building river-craft; and the manufactures include sail-cloth, ropes, &c. Pop. (1861) 5271.

SELDEN, JOHN, an illustrious English scholar and lawyer, was born December 16, 1584, near Worthing, in Sussex, studied at Hart Hall, Oxford, for three years, and then removed, first to Clifford's Inn, London, and afterwards to the Inner Temple, for the pursuit of law. It was here that his great learning began to attract attention, and won for him the friendship of Camden, Usher, Sir Robert Cotton, and Sir Henry Spelman. S. wrote his first treatise, which related to the civil government of Britain previous to the Norman Conquest, and was entitled *Analecton Anglo-Britannicon*, in 1606, when only twenty-two years of age, though it was not published till nine years later. In 1610, appeared his *Jani Anglorum Facies Altera* (English translation 1683), giving an account of the common and statute law of English Brittany to the death of Henry II.; and in 1614 was published his *Titles of Honour*, a work still regarded as of high authority on the subject of which it treats. Three years later, appeared an erudite, but, judging from what Le Clerc says, not a very critical or well-digested, work on the Syrian gods, especially in their connection with the Old Testament, entitled *De Diis Syriis, Syntagmata Duo*. Next year, however, he excited great indignation among the clergy by his *Treatise of Tythes*, in which he endeavoured to prove that tithes are not due by divine right under Christianity, but solely because the law has imposed them. S. was assailed with diatribes, animadversions, additional animadversions, historical vindications of the *jus divinum* of tithes, &c.; but it does not appear that the arguments were very convincing to Selden. In 1621, he suffered a brief imprisonment for advising the parliament to repudiate King James's doctrine that their privileges were originally royal grants; in 1623, he was elected member for Lancaster, and from this period till his death, he took a considerable part in public affairs, yet not such as to materially interfere with the continuance of scholarly pursuits. S.'s political position is somewhat difficult to define. There is no doubt that he was sincerely attached to the cause of the parliament, and as sincerely opposed to the views of the court-party and the king. But he was above all things a constitutional lawyer, and derived his ideas of the rights of the subject from the history of the nation, and not from religious fanaticism or metaphysical considerations. Still, he 'loved his ease,' according to Clarendon (who has painted S.'s portrait in his usual fine style), and so let things be done without protest, of which he did not approve. Personally, he was rather a favourite with King Charles, on account of his learning and moderation. In 1630, he was committed to the Tower, for his activity in opposing the policy of the court, and remained a prisoner for four years, when he was released through the favour of Archbishop Laud and the Lord Treasurer; in 1640, he was chosen member for the university of Oxford; and now, when the struggle between the king and the nation began to grow dead-earnest, he was occasionally suspected of not being zealous enough by such as were themselves perhaps over-zealous. He threw the weight of his learning and argument into the scale against the bishops (towards whom, like Milton and other lay-champions of freedom, he felt a peculiarly strong antipathy), when the question came up as to their tenure of seats in parliament; he was one of those who drew up the articles of impeachment against Laud; he sat as a lay-member in the Assembly of Divines at Westminster, 1643, and perplexed his clerical colleagues sadly. In 1644, he was elected one of the twelve commissioners of the Admiralty; in 1646, the sum of £5000 was voted to him by parliament, in consideration of his services and sufferings; in 1647, he was appointed one of the university 'visitors,' and always used his influence to moderate the tyranny of his fanatical colleagues. After the execution of Charles (of which it is certain he strongly disapproved, as both unlawful and inexpedient), he took little share in public matters; and when requested by Cromwell to answer the *Eikon Basilike*, he refused. His death occurred November 30, 1654, in the house of Elizabeth, dowager-countess of Kent, with whom he had long lived in such intimacy that people said they were married. The principal writings of S., besides those already mentioned, are: *Marmora Arundelliana* (1629) *De Successionibus in Bona Defuncti secundum Leges Hebræorum* (1634); *De Successione in Pontificatum Hebræorum, Libri Duo* (Leyd. 1638); *De Jure Naturali et Gentium, juxta Disciplinam Hebræorum* (1640), a work more learned than critical (like most of S.'s biblical productions, who thought far too much of the opinions of the Rabbins); and *Uxor Hebraica*; *Mare Clausum* (1635), a reply to Grotius's *Mare Liberum* (treatises which originated in a dispute between the English and Dutch concerning the herring-fishery upon the British coast, to which the Dutch laid claim); *De Anno Civili et Calendario Judaico* (1646); *De Synedriis et Præfecturis Hebræorum* (1650 *et seq.*); besides a great variety of posthumous works, of which the most famous, and also the most valuable, is his *Table-talk* (recorded and published by his amanuensis, Richard Milward, in 1689), of which Coleridge says (with considerable exaggeration, however): 'There is more weighty bullion sense in this book than I can find in the same number of pages of any uninspired writer.' S. was highly esteemed by all his great contemporaries, both royalist and parliamentarian, on account of his integrity, candour, and vast erudition; but his moral courage or enthusiasm was not remarkable (except when tilting at the bishops—*then*, like Erasmus on the monks, he was quite heroic); and, on the whole, as compared with Milton, he occupies the level which Erasmus did

in relation to Luther. S.'s works were collected and published at London in three folio volumes, 1726.

SEL D'OR, a salt employed in Photography, originally to aid in fixing and improving the image on a Daguerreotype-plate, and more recently for toning positive paper-proofs. It is a double hyposulphite of gold and sodium, the constitution of which is expressed by the formula $AuO,S_2O_2 + 3NaO,S_2O_2 + 4HO$. It is formed when 1 part of chloride of gold in solution is added to 3 parts of hyposulphite of soda, also in solution. The hyposulphite of soda should be always in excess during the mixture, a condition which is secured by adding the chloride of gold to the hyposulphite of soda, and not *vice versâ*. The salt so formed is precipitated in fine, white, crystalline needles on the addition of alcohol to the above mixed solutions; these are collected on bibulous paper, and gently dried for use. Adulterations in the commercial article, which are unfortunately only too common, may be ascertained by precipitating, igniting, and weighing the gold contained in the sample it is desired to test. Nitric acid free from chlorine will decompose this salt, and precipitate its contained gold in the metallic form.

SELE'NÉ, the Greek name of the goddess of the moon; called also *Mene*, and in Latin, *Luna*. Her myth is differently told, but the most common account makes her a daughter of Hyperion and Theia, and sister of Helios (the Sun) and Eos (the Dawn); as sister of Helios, also called *Phoibos* (the Shining One), she had the name of *Phœbe*, and latterly was identified with Artemis (see DIANA), though the identification was never quite exact, as Artemis always retained her reputation for chastity, while S. had 50 daughters by her lover Endymion, and several by Zeus, one of whom was called *Erse* ('the Dew'), indicating the original physical character of the myth. In Art, the two are always distinct. S. is represented by the poets with long wings and a golden diadem, riding across the heavens in a chariot drawn by two white horses, cows, or mules.

SE'LENITE (Gr. *Selēnē*, the moon), a transparent and beautiful variety of Gypsum (q. v.), white, or tinged with green, gray, or yellow. It receives its name from its peculiar moon-like lustre. It is often crystallised in six-sided prisms, sometimes in lenses, and twin crystals and quadruple crystals occur. It is found in common gypsum, in rock-salt, in the Blue Clay of the south of England, &c. There is in the British Museum a splendid group of crystals of S., presented by Prince Albert. S. is easily cut, and is susceptible of being split into extremely thin plates, which are flexible, although not elastic. It was used by the ancients for some of the purposes for which we use glass. The Romans imported it from Spain, Cyprus, Cappadocia, and Africa. The hothouses of Tiberius were covered with it, and Pliny mentions that it was used in the construction of beehives by those who wished to watch the operations of the bees. It is used for making the finest kind of stucco, and the most delicate pastil colours. When burned, and perfectly dry, its powder is used for cleansing and polishing articles of gold and silver, precious stones, and pearls.

SELE'NIUM (symb. Se, equiv. 39·3, and sp. gr. 4·28) is one of the metalloid or non-metallic elements. At ordinary temperatures, it occurs as a solid of a dark-brown colour, and when broken, presents a conchoidal vitreous fracture; thin splinters of it are, however, of a dark-red tint when seen by transmitted light. It is tasteless and inodorous, a non-conductor of electricity; and like sulphur, to which it presents a remarkable analogy, it may be obtained in all three forms of atomic aggregation, being solid up to 392°, when it fuses into a fluid, which boils at 650°, emitting an inodorous vapour of a deep yellow tint. When heated in the air, S. does not very readily take fire, but it is combustible, and burns with a blue flame, while a portion of it is volatilised in red fumes, which emit an odour resembling that of bisulphide of carbon or garlic. The products of combustion are oxide of S. and selenious acid, the peculiar odour being probably due to the former.

S. is of rare occurrence in nature; it is chiefly found as a selenide in combination with lead, silver, copper, or iron; but it has also been discovered in the sulphur from the Lipari Isles, and in certain sulphides of iron, which accounts for its detection in sulphuric acid. It is unnecessary to enter into any description of the mode of isolating it; nor need we do more than simply mention that it forms three compounds with oxygen —SeO, oxide of S.; SeO_2, selenious acid; and SeO_3, selenic acid; while with hydrogen it forms HSe, seleniuretted hydrogen, or hydroselenic acid, a colourless gas, which resembles, but is more offensive than sulphuretted hydrogen. Berzelius found that by the application of the nose to a bubble of it not larger than a pea, he was deprived of the sense of smell for several hours. It is prepared in the same way as the corresponding sulphur gas. As it is soluble in water, it should be collected over mercury.

S. was discovered in 1817 by Berzelius, who named it from *Selēnē*, the Gr. for 'the moon,' because it was associated with tellurium, which is named from *Tellus*, the Lat. for 'the earth.'

SELEU'CIA, the name of seven ancient cities of Asia, situated in Syria, Pisidia, Pamphylia, Cilicia, Caria, and Mesopotamia, and founded during the earlier existence of the dynasty of the *Seleucidæ* (q. v.). The most distinguished of these were: 1. SELEUCIA PIERIA, founded by Seleucus Nicator, on the sea-shore, about 4 miles north of the mouth of the Orontes, and strongly fortified. It was the seaport of Antioch, and became of great importance during the wars between the Seleucidæ and the Ptolemies for the possession of Syria. It rapidly declined under the Roman dominion. The ruins have been fully explored and described in modern times by Pococke (*Observations on Syria*) and Chesney (*Royal Geographical Society's Journal*, vol. viii.). Its once magnificent port is in such an extremely good state of preservation as to require few repairs to render it serviceable; and the remarkable tunnel of 1088 yards in length, which was excavated out of the solid rock, and formed the only communication between the city and the sea; and the remains of its triple line of walls, of its citadel, temples, amphitheatre, necropolis, &c., all attest the former importance and splendour of the city.—2. SELEUCIA ON THE TIGRIS, was also built by Seleucus Nicator, on the west bank of the Tigris, 40 miles (according to Strabo 33) north-east of Babylon, which was despoiled to supply materials for the construction of the new city. Situated in a district of great fertility, commanding the great trading routes of Assyria, Babylonia, and Western Persia, it rapidly rose to great wealth and splendour, supplanted Babylon as the capital of the eastern portion of the Seleucide monarchy, and when in the acme of its greatness, contained a population of more than 600,000. Even in Strabo's time, it was larger than Antioch in Syria, the greatest commercial emporium of Asia; and down to the period of its final destruction, the number of its inhabitants is said to have never fallen below half a million. During the decline of the Seleucide monarchy, it became independent, and formed, from its wealth and splendour, an irresistible bait to the robber-tribes

of Southern Armenia and Media, who partially plundered it on more than one occasion. But its position on the confines of Persia, which gave it its greatness, was also the cause of its destruction; for when the Seleucide monarchy was swallowed up by the Romans, and the long and desolating struggle between the latter and Persia had commenced, S., placed between two fires, was speedily brought to ruin. It was burned by Trajan (116 A.D.), and a few years afterwards, by Lucius Verus; and when visited by Septimius Severus was as desolate as the mighty city it had supplanted. The Emperor Julian, on his expedition to the East, found the whole country round it converted into a vast marsh, the haunt of innumerable beasts of chase and wild-fowl, and the city itself completely deserted.

SELEU'CIDÆ, the dynasty of kings to whom fell that portion of Alexander the Great's immense and ill-compacted monarchy which included Syria, a large portion of Asia Minor, and the whole of the eastern provinces.

SELEUCUS I., surnamed NICATOR, the first of this line, was the son of Antiochus, a distinguished officer in the service of Philip of Macedon, and was born about 358 B.C. He was one of the conspirators against Perdiccas, and in the second partition of the provinces of Alexander the Great's kingdom, obtained Babylonia, to which, with the aid of Antigonus, he subsequently added Susiana; but a misunderstanding with that powerful chief having arisen, Seleucus took refuge in Egypt (316 B.C.). The victory gained by Ptolemy over Antigonus's son, Demetrius, at Gaza having laid open the route to the East, Seleucus returned to his satrapy, amidst the joyous congratulations of his subjects (312 B.C.). From October 1 of this year (the date of Seleucus's return to Babylon), commences the *era of the Seleucidæ*. Having next recovered Susiana, he conquered Media, and extended his power to the Oxus and Indus. Of his campaign against Sandrocottus (q. v.), there are few details extant. In 306 B.C., he assumed the regal title; and four years afterwards, joined the confederacy of Ptolemy, Lysimachus, and Cassander, against the now formidable Antigonus, deciding the battle of Ipsus (301 B.C.) chiefly by his cavalry and elephants. Being now, after Antigonus's death, the most powerful of Alexander's successors, he obtained the largest share in the conquered kingdom, a great part of Asia Minor and the whole of Syria falling to him. Towards the close of his reign, war broke out with Demetrius (now his father-in-law), and afterwards with Lysimachus, king of Thrace and the other part of Asia Minor, both contests terminating in the defeat and death of his opponents, and being followed by the acquisition of the rest of Asia Minor. He was assassinated (280 B.C.) by Ptolemy Ceraunus. Of Seleucus's personal character, little can be gathered from the fragments of his history which remain to us; according to Pausanias, he was the most upright of Alexander's successors, unstained by those crimes which have foully blotted the characters of the others; but of his consummate generalship and great political talents, we have sufficient proof. He pursued with great zeal the plan of 'Hellenizing' the East, by founding numerous Greek and Macedonian colonies in various parts of his dominions; he also built numerous cities, several of which —as Antioch in Syria, and Seleucia on the Tigris—rose to be among the most populous and wealthy in the world.—After the reigns of ANTIOCHUS I. (q. v.) and ANTIOCHUS II. (q. v.), SELEUCUS II. (246—226), surnamed CALLINICUS, obtained the throne; but having, at the instigation of his mother Laodice, murdered his stepmother Berenice, an Egyptian princess, he was driven from his kingdom by Ptolemy Euergetes (q. v.). However, he recovered his throne on Ptolemy's withdrawal; and though defeated in a great battle with the Egyptians, he succeeded in maintaining his hold of Syria and most of Asia Minor against both the Egyptians, and his younger brother Antiochus, who exercised independent authority over part of Asia Minor. Antiochus was at a later period wholly defeated in Mesopotamia, and soon after murdered by robbers. Seleucus undertook a great expedition against the revolted provinces of Parthia and Bactria, but was totally routed by Arsaces I., king of Parthia; while, on the north-west, several provinces were wrested from him by Attalus, the king of Pergamus.—His sons, SELEUCUS III. (226—223), surnamed CERAUNUS, and ANTIOCHUS III. (q. v.), 'the Great,' were his successors, the latter being the first of the dynasty who came into collision with the Romans.—SELEUCUS IV. (187—175), surnamed PHILOPATOR, was eager to dispossess the king of Pergamus of the provinces which he had taken from the Syrian monarchy, but fear of the Romans prevented him from carrying out his design.—ANTIOCHUS IV. (q. v.), EPIPHANES (I.) ('the Illustrious'), conquered Cœle-Syria and Palestine from the Egyptians, to whom they had been given by his father; but retired from Egypt at the bidding of the Romans. He practised the most atrocious cruelties on the Jews, whose religion he endeavoured to root out, and introduce the Greek religion; but the heroic resistance of the Maccabees (q. v.) completely foiled his project. He died in a state of raving madness, which was attributed to his sacrilegious crimes by his subjects, who, in derision, converted his surname into EPIMANES ('the Madman').—The succeeding names of the dynasty were: ANTIOCHUS V., EUPATOR (164—162); DEMETRIUS I., SOTER (162—150), who regained Babylon, lost Judea, and was defeated and slain by the impostor Alexander Balas (150—146); DEMETRIUS II., NICATOR (146—138, 128—125), who overthrew the impostor, and was himself taken prisoner by the Parthians, Syria having been already seized by DIODOTUS, surnamed TRYPHON, who set up the puppet ANTIOCHUS VI., THEOS (144—142), and afterwards ascended the throne himself (142—137); ANTIOCHUS VII., SIDETES (137—128), who restored the royal line of the Seleucidæ; ANTIOCHUS VIII., GRYPUS (125—96), who was compelled to share his dominions with his half-brother ANTIOCHUS IX., CYZICENUS (111—95); SELEUCUS V. or VI., EPIPHANES (96—94), and ANTIOCHUS X., EUSEBES (95—83), who continued the division till 94 B.C., when the latter was victorious in a pitched battle, and seized the whole kingdom; for which, however, he was forced to fight with Philip, and ANTIOCHUS XI., EPIPHANES (II.), the younger brother of Seleucus; and DEMETRIUS III., EUCÆRUS (94—88), a third brother of Seleucus, who, with Philip, next claimed the sovereignty, which was taken from them by Tigranes (83—69), king of Armenia, at the solicitation of the Syrians; ANTIOCHUS XII., DIONYSUS, a fourth brother of Seleucus, and ANTIOCHUS XIII. (69—65), ASIATICUS. The short-lived prosperity of this dynasty, for it had begun to decline during the reign of SELEUCUS II., 80 years after its foundation, is principally owing to the fatal principle on which it was founded—viz., that of establishing a Græco-Macedonian power in a foreign country, instead of conciliating the attachment of the native populations, and governing them more in accordance with the Eastern method; the consequences were the successive revolts of the natives, the foundation of the independent and hostile kingdoms of Bactria, Parthia, Armenia, Judea, and the ultimate conversion of the small remnant into a Roman province by Cneius Pompeius, 65 B.C.

SELF-DENYING ORDINANCE, a measure carried through parliament in 1645 by the influence of Cromwell and the Independents, with the view of removing Essex and the Presbyterians from the command of the army. It was moved by a fanatic of the name of Zouch Tate, who, on the ground that 'there is but one way of ending so many evils, which is, that every one of us freely renounce himself,' proposed, that 'no member of either House shall, during this war, enjoy or execute any office or command, civil or military, and that an ordinance be brought in accordingly.' The ordinance, which was clearly intended to take the executive power out of the hands of the more moderate politicians, and form an army independent of parliament, was the subject of violent and protracted debate, but eventually passed in both Houses, and became law. The consequence was that Essex, Warwick, Manchester, and others gave in their resignation, and the conduct of the war was intrusted to Fairfax; Cromwell, to whom, as a member of the Lower House, the self-denying ordinance extended, as much as to Essex and the rest, had the duration of his commission prolonged by the Commons on account of his invaluable services as a leader of cavalry, and by his brilliant achievements soon surpassed his commander in reputation.

SELIM I., Sultan of Turkey, son of Bajazet II., was born in 1467, dethroned his father by the aid of the Janizaries, 25th April 1512, and ascended the throne. To secure himself in his elevation, he caused his father, brothers, and nephews to be put to death, thus beginning a policy which he pursued inflexibly through the whole of his subsequent career, viz., to destroy without scruple every actual or possible obstacle to the accomplishment of his own ends. Urged on by a devouring appetite for conquest, and by the warlike fanaticism of the Janizaries, he declared war (1514) against Shah Ismail of Persia, and marched eastwards with an army of 250,000 men, massacring on the way 40,000 Shiites. He encountered Ismail at Calderoon, and defeated him with immense loss; but a spirit of disaffection breaking out in his army, he was compelled to content himself with this success, which gave him possession of Diarbekir and Kurdistan. In the following year, he overran Armenia; and leaving his lieutenants to complete this conquest, he marched against the Mameluke Sultan of Egypt, whom he had previously endeavoured to detach from intimate alliance with the Persian monarch. Kansû-ghori, the Egyptian sultan, was totally defeated (1516) at Marjabik by S., and Syria became the prize of the victor; and Kansu's successor, Touman-Bey, was still more unfortunate, his army being almost extirpated (1517) at the battles of Gaza and Rudania. The victorious Turks then entered Cairo without opposition; Touman-Bey and his chief supporters were put to death, and Egypt incorporated with the Ottoman empire. The last lineal descendant of the Abbaside calif, who was then resident in Egypt, transmitted to S. the religious prestige which had devolved upon himself by descent, and at the same time bestowed upon him the title of 'Imaum,' and the standard of the Prophet. In consequence of this gift, the Ottoman sultan became the chief of Islam, as the representative of Mohammed; and the sacred cities of Mecca and Medina, along with the chief Arabian tribes, in consequence acknowledged his supremacy. Thus, in less than four years, S. did more to extend the Ottoman empire than any of his most renowned predecessors during a whole reign. He also laid the foundation of a regular marine, constructed the arsenal of Pera, chastised the insolence of the Janizaries with savage severity, and laboured to ameliorate, by improved institutions, the condition of the various peoples he had conquered. He died 22d September 1520, while planning fresh campaigns against both Persians and Christians. This prince, who in a sense merited his title of *Yavuz* (the Ferocious), was nevertheless a lover and encourager of literature, and even himself cultivated the poetic art. S. was succeeded by his son, Solyman the Magnificent (q. v.).

SELIM III., Sultan of Turkey, the only son of Mustapha III., was born 14th December 1761, and ascended the throne on the death of his uncle, Abdul-Hamid, in 1789. Seeing clearly the causes of the decadence of the empire, and the proper remedies, he inaugurated a policy of renovation and progression; but the war with Russia, in which his newly raised army of 150,000 men was totally defeated, first by the Prince of Coburg, and next by Suwarof, put a stop for a time to his schemes of reform. He was compelled, in 1791, to cede Choczim to Austria, and in the following year, all his possessions beyond the Dniester to Russia. About this time, his good harmony with Napoleon was troubled by the expedition of the French to Egypt, and subsequently by the question of the recognition of the French Empire, but on the whole, S. continued the faithful ally of France; and at every opportunity pursued with ardour his various reforms, establishing cannon-foundries, and organising a body of troops ('the Nizam-Djedit'), armed, clothed, and disciplined in the European fashion; but this last reform stirred up against him (1805) all the fanatic bigotry of his subjects. The priests of Islam even preached revolt in different parts of the empire, and accused their sovereign of despising the holy injunctions of the Koran, so that S. felt compelled to adopt a more cautious policy. At length, a formidable rebellion broke out, and the Nizam-Djedit, who attempted to suppress it, were overpowered, their commander put to death, and the rebels marched into Constantinople, their ranks being swelled at every step by bodies of disaffected Janizaries. All those who had favoured or forwarded the sultan's schemes were seized and put to death, and S. was compelled to issue a decree suppressing the new institutions. But the malignant enmity of the mufti and his coadjutors was not thus to be satisfied, and S. saw himself forced to resign the throne (1807) to his cousin, *Mustapha IV.* (1807—1808).

On the news of this insurrection being conveyed to Mustapha-Bairaktar, the Pasha of Rustchuk, and one of the sultan's chief advisers, this energetic and able soldier marched upon Constantinople, with a view to reinstate S. on the throne, but on his arrival the unfortunate monarch was strangled, and his body cast at the feet of Bairaktar. See BAIRAKTAR. Thus perished S., and with him the first attempt at reformation in Turkey; the effects of which, however, were not wholly lost, for manufactures had begun to flourish, thousands of silk and other looms were now in vigorous operation, a printing press had been established in Scutari, and many other improvements calculated to foster the prosperity and happiness of his subjects, had been inaugurated; though these advantages, the natural result of S.'s enlightened patriotism, were neither understood nor appreciated by the great majority of his ignorant and fanatical subjects.

SELI'MNO, a walled, manufacturing town of European Turkey, in Rumili, at the southern base of the Balkan Mountains, 78 miles north of Adrianople. Owing to its far inland position, there is little communication between the town and the coast, and consequently the annual fair held here is

of very great importance. Arms, cloth, and attar of roses are manufactured. Pop. 15,000.

SELJUKS, or SELJUK-TURKS, were an offshoot of the Hoei-He or Hoei-Hu, a collection of tribes of Turkish race, who, being driven southwestward from the Chinese wall, had, in 744 A.D., overwhelmed that Turkish empire of Kiptchak which had given so much annoyance to the Sassanidæ (q. v.) during their reign in Persia. The Hoei-Hu rapidly extended their power from the Caspian Sea as far as the Hoang-ho, and at the time when the S. separated themselves from them, were ruled by a chief named Bigû Khan. Seljuk, from whom the S. derived their name, was the chief of a small tribe which had gained possession of Bokhara and the surrounding country. His sons, attracted by the beauty and fertility of Khorassan, began, about 1027, to migrate to that country, and after some struggles with the Ghiznevide sultans, established themselves in Northern Khorassan, with TOGRUL BEG, the eldest grandson of Seljuk, as their chief, and Nishapur as their capital. Togrul, leaving his brother in Khorassan, set out on his conquering march, subdued Balkh and Khaurezm in 1041, Irak-Ajemi in 1043, subsequently adding to these Kerman and Fars. He then advanced to Bagdad, which he took in 1055, dethroning the last vizier of the Dilemite (see SAMANI) dynasty, and being invested by the reigning calif with the vacant office; after which he completed his conquest of Persia by the reduction of Irak-Arabi and Mosul about 1061. The S. were zealous Mohammedans, and Togrul Beg seems to have been a vigorous promoter of the faith which he professed, for he built numerous mosques, subsidised pious and learned men, and treated the calif—his spiritual chief—with profound respect. After his death in 1063, his nephew, ALP-ARSLAN (q. v.), succeeded to supreme power, and became one of the most renowned monarchs of Asia. His son, MELEK SHAH (1073—1093), the most powerful monarch of this dynasty, added, by means of his generals, Arabia, Asia Minor, Armenia, Syria and Palestine, and Transoxiana to his empire, which now extended from the Hellespont to the borders of Chinese Tartary; and even the ruler of Cashgar acknowledged his authority. This empire, though extensive and ill-compacted, was preserved in the highest order and prosperity by his able minister, the virtuous Nizam-ul-Mulk, under whose firm, just, and wise government the rights of all classes were maintained, religion promoted, and learning encouraged, till the Persians who had dreaded the conquest of their country by the Turks as the worst of evils, were forced to confess that it had proved the greatest of blessings. In 1092, Melek Shah, lending an ear to the misrepresentations of Nizam-ul-Mulk's enemies, deprived him of his office; and the aged minister was soon afterwards assassinated by one of the followers of Hussun Subah, the chief of the Assassins (q. v.), and the mortal enemy of the good ex-vizier. Hospitals, caravansarais, bridges, roads, and canals attest the zeal with which the commercial interests of the empire were furthered; while the colleges of Bassora, Ispahan, and Herat, the law-college of Bagdad, and the observatory (the first in Asia) of the same city, indicate the care bestowed on the promotion of literature and science. Melek Shah, under whom the empire of the S. had attained the height of its power and splendour, laid a sure foundation for its rapid decline, by subdividing it into a number of separate principalities, all professedly subject to the central state of Iran or Bagdad. The chief of these principalities were: 1. The central state of *the S. of Iran*, whose ruler was the vizier of the calif, and exercised direct authority over Northern and Western Persia to the borders of the Arabian desert. The chief monarchs of this branch were Mohammed Shah, whose generals warred with the Crusaders in Palestine, and Sultan Sanjar, one of the most celebrated of the S. princes, great both in success and misfortune. This branch was annihilated in 1194 by the Shah of Khaurezm. 2. *The S. of Kerman*, who were annihilated in 1191 by the Ghuz Turkomans. 3. *The S. of Iconium*, who ruled over Asia Minor, and whose founder was Soliman, a great-grandson of Seljuk. This branch endured for 224 years—from 1075 to 1299—and during that period was engaged in numerous wars with the Byzantines and with the Crusaders, both of whom learned to dread its power. During its last years, it was tributary to the Mongols; and in 1299, the present Turkish empire rose on the ruins of its power (see OTHMAN). 4. *The S. of Aleppo*, who ruled from 1079 till their extinction in 1114. 5. *The S. of Mosul*, who were speedily supplanted by *attabegs*, or independent governors, of whom Zenghi, and his renowned son, Noureddin (q. v.), were the most celebrated. 6. *The S. of Damascus*, an offshoot (1096) from the Aleppo principality, which lasted till 1155, when it was put an end to by Noureddin. 7. *The S. of Mardein*, who only appear in common history as the allies of the S. of Iconium, Mosul, Aleppo, and Damascus, against the mighty crusading armies of Western Europe. And 8. *The S. of Khaurezm* (*Khiva*), who founded a great empire, including the whole of the country within the Jaxartes, the Bolor Mountains, the Indus, the Sea of Oman, and the Persian Gulf; but the last monarch, Allah-ed-din Mohammed Shah, having wantonly put to death some Mongol merchants who were pursuing their avocations within his dominions, was doomed to destruction by the terrible Genghis Khan (q. v.), who crossed the Sir-Daria, conquered Transoxiana, defeated Mohammed's armies, and drove the Shah himself to take refuge in an island of the Caspian, where he died. The advance of the Mongols was gallantly opposed by Mohammed's celebrated son, Jelal-ed-din, who twice defeated them; but being totally routed (1221), on the west bank of the Indus, by Genghis himself, he plunged his horse into the Indus, and safely reached the opposite bank, none of his enemies daring to follow him. The whole of this extensive empire now fell under Mongol domination.

SELKIRK, ALEXANDER. See JUAN FERNANDEZ.

SELKIRK, a Scottish royal burgh, capital of the county of the same name, on an eminence overlooking Ettrick Water and the famous field of Philiphaugh, where General David Leslie defeated Montrose and crushed the cause of King Charles in Scotland, 40 miles by the North British Railway south-south-east of Edinburgh. The town-hall, with a spire 110 feet high, and the monuments to Sir Walter Scott and to Mungo Park, are the principal architectural features. S. has very large woollen mills. Tweeds, hosiery, and blankets are the chief articles of manufacture. Pop. (1861) 3695.

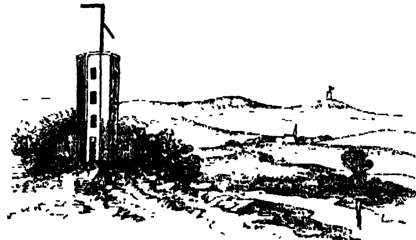
S. commands a splendid view across the valley or haugh in which the Ettrick and Yarrow meet. It is within a few miles of many of the most famous localities in Scotland, and is a favourite starting-point for tourists desirous of exploring the 'Scott' country (Melrose, Abbotsford, Dryburgh, &c.), the 'Forest,' the Yarrow, and St Mary's Loch. From Ettrick, a large body of fighting men went to join King James in his fatal march to Flodden. Upwards of a hundred were from S. alone, of whom only four returned, but these proudly bore a standard taken from the enemy on that occasion. The manufacture of 'single-soled shoon' long flourished

here, and the 'Souters of Selkirk' are commemorated in song and story.

SELKIRKSHIRE, in ancient times called Ettrick Forest, is bounded by the counties of Midlothian, Roxburgh, Dumfries, and Peebles, on the N., E., S., and W. respectively. It extends in length from north to south about 28 miles, and from east to west 16 to 18 miles, and consists mainly of the two parallel valleys through which flow the rivers Ettrick and Yarrow. Its area is 266 sq. m., or 170,240 acres. S. contains three entire parishes, and parts of other seven. It is in a great measure a pastoral county, and some of the hills are of considerable altitude, being upwards of 2000 feet in height. The hills are rounded at the top instead of peaked, and are covered generally with grass, affording excellent pasturage, but in some places with heather. The arable land, situated from nearly 300 to 800 feet above sea-level, and bearing the proportion of about one-eighth of the area, is, in general, of a light soil, and produces the ordinary crops in abundance. Besides the Ettrick and Yarrow, the Tweed, Gala, and Cawder flow through parts of the county. The banks of several of these are beautifully wooded; but the extensive woods from which the county originally took its name of the Forest, have disappeared. According to the last agricultural statistics, taken 8 years ago, the number of occupants of land was 172, and the acreage under grass and hay was 6012 acres; and under crops, 14,411—of which there were in wheat 261 acres, averaging 29 bushels, 1 peck per acre; 949 acres of barley, averaging 36 bushels; 4162 acres of oats, averaging 38 bushels; 29 acres of beans and pease, averaging 17 bushels, 1 peck; turnips, 2624 acres, averaging 16 tons, 15 cwt.; and 222 acres of potatoes, averaging 2 tons, 7 cwt. The above enumeration shews an average of produce considerably above most of the other counties, except potatoes, which is the 7th lowest. Of horses, there were 763; of cattle, 2449; of sheep, 145,732; of swine, 474—total stock, 149,418. The old valued rent was £6692. The new valuation, including the burgh, is rather more than £70,000. This county contains some interesting historical scenes, among which is the field of Philiphaugh, where the great Marquis of Montrose was defeated by the Covenanters under General Leslie. Oakwood Castle, in ruins, was the residence of the famous wizard Michael Scott; and Newark, also in ruins, was the residence of Anne, Duchess of Buccleuch, where the *Lay of the Last Minstrel* is represented by Scott as having been sung. S. is pretty well appointed for roads, and the Hawick line of the North British Railway runs for a short distance along its border, from which, at Galashiels, there is a branch to Selkirk. There are 15 places of worship, 5 of which belong to the Establishment, 5 to the Free Church, and the rest to other dissenters. There is no coal, or lime, or sandstone. The Douglas family, four centuries ago, were the principal proprietors. The Duke of Buccleuch now holds about two-thirds of it. The population in 1861 was 10,449, the inhabited houses 1468. S. returns one member to parliament.

SE'LTERS WATER (commonly but incorrectly written *Seltzer Water*), takes its name from the village of Lower Selters near Limburg, in the duchy of Nassau, where several springs united, in one basin, yield 5000 cubic feet an hour of this sparkling and effervescing mineral water. Its chief ingredients are carbonic acid, carbonate of soda, and common salt. It acts as a mild stimulant of the mucous membranes and as a diuretic; and is applied in chronic disorders of the digestive, respiratory, and urinary organs. It is much recommended as a beverage, either alone or with sugar, to those suffering from liver complaint, and in hot climates and seasons. More than 1½ millions of jars or bottles of this famous water are exported yearly to all quarters of the world, affording to the state a revenue of above £6000. The spring was discovered early in the 16th c., but was at first so little prized, that in the middle of the 18th c. it was rented for 4s. The water is little drunk at the spring. Artificial Selters Water is extensively manufactured both on a large scale and for domestic use. See AËRATED WATERS.

SE'MAPHORE (from *sēma*, a sign, and *pherō*, I bear) was the name applied to the system of telegraphy in use before the application of the electric current. Semaphores were first established by the French in 1794, as a plan for conveying intelligence from the capital to the armies on the frontier. In the following year, Lord George Murray introduced them in England; and by their means the Board of Admiralty were placed within a few minutes of Deal, Portsmouth, or Plymouth. These semaphores consisted of towers built at intervals of from 5 to 10 miles, on commanding sites. On the top of each tower was the telegraph apparatus, which at first



Semaphore.

comprised 6 shutters arranged in 2 frames, by the opening and shutting of which, in various combinations, 63 distinct signals could be formed. In 1816, Sir Home Popham substituted a mast with 2 arms, similar to many of the present railway signals. The arms were worked from within the tower by winches in the look-out room, where a powerful telescope in either direction constantly commanded the mast of the next station. If a fog set in at any point on the route, the message was delayed; otherwise, when a sharp look-out was kept, the transmission was very rapid. For instance, the hour of one by Greenwich time was always communicated to Portsmouth when the ball fell at Greenwich; the semaphores were ready for the message, and it commonly passed from London to Portsmouth and the acknowledgment back to London within three-quarters of a minute. Each station was in the charge of a naval officer—usually a lieutenant—with one or two men under him. To save the cost of this establishment, the Deal and Plymouth lines fell into disuse soon after the peace of 1815; and the superior advantages of the electric telegraph being incontestable, the Portsmouth line sent its last message on the 31st December 1847, and, on land at least, the semaphore closed its career of usefulness for ever. In calm weather, when flags will not extend, semaphores are employed on board ship as a means of signalling from vessel to vessel, or to the shore; in such a case, the post containing the arms is movable, and can be readily shipped or unshipped near the stern. See also SIGNAL.

SE'MÉ, in Heraldry. When a charge is repeated an indefinite number of times so as to produce the

appearance of a pattern, the term *semé* (sometimes *aspersed* or *powdered*) is applied to it. When a field is semé, it is treated as if it were cut out of a larger extent of surface, some of the charges being divided by the outline of the shield. The term *crusilly* denotes semé of cross crosslets, and *billetty* semé of billets.



Semé.

SEMECA'RPUS, a genus of trees of the natural order *Anacardiaceæ*. The MARKING NUT of India is *S. anacardium*, a tree 50 feet high, growing on mountains. The swollen receptacle of the flower becomes a succulent fruit, eatable when roasted, but astringent and acrid when raw. On the receptacle is seated the nut, which is heart-shaped and black, consisting of a kernel—not unwholesome, although rarely eaten—surrounded by two skins, between which is a black acrid juice. This juice is used in medicine as an external application to heal rheumatism, &c. It is also in general use in India for marking cotton cloth; and the colour is improved, and running prevented, by the addition of a little quicklime and water. The wood of the tree contains so much acrid juice that it is dangerous to work upon.

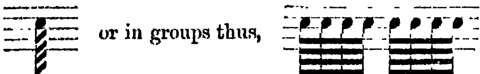
SE'MELE. See BACCHUS.

SE'MENCINE, SEMEN CINÆ, AND SEMEN CONTRA. See ARTEMISIA.

SEME'NDRIA, a frontier fortress of the principality of Servia (q. v.), stands amid romantic scenery on the right bank of the Danube, 28 miles south-east of Belgrade. The inhabitants, about 8000 in number, are employed principally in the wine-culture, in breeding hogs, and in general trade. It was at one time the seat of the Servian kings; and it has been frequently stormed by the nations who have contended for the Danube from the middle ages to the present century.

SE'MIBREVE, in Music, a note of half the duration of the breve of old ecclesiastical music, but the longest note in use in modern music. It is represented by a character circular or elliptical in form [note] and is adopted as the integer or measure-note, the other notes—minim, crotchet, quaver, &c.—being proportional parts of it.

SEMI-DEMI-SEMIQUAVER, a musical note, of which 8 are equivalent to a quaver, 32 to a minim, and 64 to a semibreve. It is represented thus,



[note] or in groups thus, [notes]

SE'MINOLES, a tribe of American Indians, originally a vagrant branch of the Creeks, whose name, Seminole, signifies wild or reckless. In 1705, they aided in driving the Appalaches from Florida; and in 1817, they joined with the Creeks and some negroes who had taken refuge with them, ravaged the white settlements in Georgia, plundering plantations, and carrying off slaves, whom they refused to surrender. General Jackson, sent to punish them, took at the same time several Spanish forts, and hastened the negotiations which ended in the cession of Florida to the United States. At this cession in 1823, the S. engaged to retire into the interior, and not molest the settlers; but as the negroes continued to take refuge with them, a treaty was made with some of the chiefs, in 1832, for the removal of the whole tribe west of the Mississippi. This treaty was repudiated by the tribe, at the instigation of Osceola (q. v.), one of their chiefs; and a war commenced against a handful of savages, which lasted eight years, and cost thousands of lives, and ten millions of dollars. In the end, the remains of the tribe were removed to the Indian Territory on the borders of Arkansas.

SEMIPALATI'NSK, an extensive Russian territory in Siberia, is bounded on the E. and S. by Tomsk, the Chinese Empire, and Turkestan. Area, 178,128 sq. m.; pop. 217,451. It is separated from Turkestan on the south by the Alexandrian Mountains in lat. 42° 30′ N., and it is traversed by several other mountain chains. The chief rivers are the Irtish, Ili, and Chui; and among the lakes are those of Issik-Kul, Ala-Kul, and Balkash. The country abounds in pasturage, and cattle form almost the sole wealth of the inhabitants, although the precious metals, together with lead and copper, are found. Steamers ply on the great rivers and lakes.—Semipalatinsk, the capital, stands on the left bank of the Irtish, in lat. about 50° 15′ N. It is the seat of an important transit-trade, and contains upwards of 7000 inhabitants.

SEMI-PELA'GIANISM, a modification, as the name implies, of the doctrine of the Pelagians as to the powers of the human will, and as to the effects to be attributed to the action of the supernatural grace of God, and of the divine decree for the predestination of the elect. The Pelagians (q. v.), discarding altogether the doctrine of the fall of Adam, and the idea that the powers of the human will had been weakened through original sin, taught that man, without any supernatural gift from God, is able, by his own natural powers, to fulfil the entire law, and to do every act which is necessary for the attainment of eternal life. The condemnation of this doctrine by the several councils held in the early part of the 5th c. is capable of various constructions, and has been urged by some to the extreme of denying altogether the liberty of man, and converting the human will into a merely passive instrument, whether of divine grace upon the one hand, or of sinful concupiscence upon the other. The writings of St Augustine on this controversy have been differently construed by the different Christian communions (see PELAGIANS); and the same diversity of opinion existed in his own day. Among those who, dissenting from the extreme view of Pelagius, at the same time did not go to the full length of the Augustinian writings in opposition to Pelagius, were some monks of the southern provinces of Gaul, and especially of Marseille, whence their school was called Massilian, from the Latin name (*Massilia*) of that city. Of these leaders, the chief was a priest named Cassian, who had been a deacon at Constantinople. Of the system which he propounded, without going into the details, although many of them are exceedingly curious and interesting, it will be enough to say that it upheld the sufficiency of man's natural powers only so far as regards the first act of conversion to God and the initial act of man's repentance for sin. Every man naturally possesses the capability of beginning the work of self-conversion; but for all ulterior acts, as well as for the completion of justification, the assistance of God's grace is indispensable. The Semi-Pelagian doctrine is often confounded with that of the Molinistic (see MOLINA) school of Roman Catholic theology; but there is one essential difference, viz., that the latter persistently maintain the necessity of grace for all supernatural acts, even for the beginning of conversion, although they are generally represented as

agreeing with the Semi-Pelagians as to the mode of explaining the freedom of the human will acting under the influence of divine grace. The chief writers in the controversy were Prosper, Hilary, and Fulgentius; and the question was referred to Celestine, Bishop of Rome in 431. It continued, however, to be agitated in the West for a considerable time. Faustus, Bishop of Riez, towards the end of the 5th c., revived the error, and it was condemned in a council held at Arles in 475, and still later in a synod (the second) held at Orange (Arausio) in 525, and again in the third council of Valence in 530.

SEMIPLE'NA PROBA'TIO, in Scotch Law, is that kind of half-proof, half-suspicion which was usually given in cases of affiliating a bastard, as well as in a few other cases. It was a species of *primâ facie* evidence; and when considered by the court sufficient, it was eked out by the oath of the party, called an Oath in Supplement (q. v.). The practical effect of the admission of parties as witnesses, under 16 Vict. c. 20, has been to do away with Oaths in Supplement, the parties being usually the principal witnesses, and the court deciding from a consideration of the balance of credibility between them.

SE'MIQUAVER, a musical note, represented thus, [note] or in groups thus, [notes] equivalent in value to ½ of a quaver, ¼ of a crotchet, ⅛ of a minim, or $\frac{1}{16}$ of a semibreve.

SEMI-QUI'ETISM, a form of mystical asceticism which, while it adopts the theoretical principle, that the most perfect state of the soul is that of passive contemplation, and denies, in certain conditions of the soul, the necessity of prayer or other active manifestations of virtue, yet maintains the incompatibility of this passive contemplation with any external sinful or sensual action. The Semi-Quietists thus differed from the grosser sectaries referred to under QUIETISM.

SEMI'RAMIS. See ASSYRIA.

SEMITIC. See SHEMITIC.

SE'MITONE, in Music. The name given to the smaller intervals in the diatonic scale, as E F or B C, in which the ratio is as 15 to 16.—In the pianoforte, the interval between any two notes between which no other note is interposed, as C to C♯ or B♭ to B, is a semitone.

SEMLER, JOHANN SALOMO, one of the most influential German theologians of the 18th c., was born, 18th December 1725, at Saalfeld, where his father was archdeacon, educated at Halle, and in 1749 went to Coburg as professor at the gymnasium. In 1751, he was appointed a Professor of Theology at Halle, where he taught with great success; and six years later, became director of the theological seminary there. He died 14th March 1791. S. was, in the early part of his student-career, somewhat of a Pietist, but the prelections of Sigm. Jak. Baumgarten may be said to have revolutionised his religious convictions, and swung him round to rationalism, of which he was the first systematic exponent. S.'s rationalism, however, was always moderate in *degree*, though definite enough in *kind*. As a thinker, he was deficient in philosophical consistency and breadth of view; and as a writer, he possessed no literary skill or grace; but his works are valuable for the spirit of historical criticism by which they are pervaded. The principal are: *Apparatus ad liberalem Veteris Testamenti Interpretationem* (Halle, 1773), *Abhandlung von der Untersuchung des Kanons* (4 vols., Halle, 1771—1775), *De Dæmoniacis* (Halle, 1760), *Umständliche Untersuchung der Daemonischen Laute* (Halle, 1762), *Versuch einer Biblischen Daemonologie* (Halle, 1776), *Selecta Capita Historiæ Ecclesiasticæ* (3 vols., Halle, 1767—1769), *Commentationes Historicæ de Antiquo Christianorum Statu* (2 vols., Halle, 1771—1772), *Versuch Christlicher Jahrbücher oder ausführliche Tabellen über die Kirchengeschichte bis aufs Jahr.* 1500 (2 vols., Halle, 1783—1786), *Observationes novæ, quibus Historia Christianorum usque ad Constantinum Magnum illustratur* (Halle, 1784).—See his *Lebensbeschreibung von ihm selbst verfasst* (Halle, 1781—1782), Wolf, *Ueber Semler's letzte Lebenstage* (Halle, 1791), H. Schmid, *Theologie Semler's* (Nordlingen, 1858), and Tholuck in his *Vermischte Schriften.*

SEMLI'N, a frontier town of Austria, in the Military Frontier, stands on a tongue of land at the junction of the Save and Danube, on the right bank of the latter, opposite Belgrade. Within recent years, the town has been much improved, though even yet a suburb consisting of mud huts thatched with reeds stretches along the Danube. The only noteworthy edifices are the churches, the German theatre, and the Lazaretto (*Contumaz*), the chief quarantine station in the whole of the Military Frontier. At this institution, travellers crossing from Turkey are compelled to remain a greater or less time—sometimes 40 days—in proportion to the violence and proximity of the plague. The reason why the principal Lazaretto is here is, that S. is the great seat of the Turco-Austrian transit-trade, and the principal ferry for passengers from Christendom to the land of the Moslem. Pop. 9900.—For a graphic notice of S., see Kinglake's *Eothen.*

SEMMERING, a mountain on the borders of Styria and Austria, and 44 English miles south-west-by-west from Vienna, is 4416 feet above the level of the sea. The Vienna, Grätz, and Trieste Railway has been carried across this mountain by a series of ingenious engineering contrivances. See GLOGGNITZ.

SEMNOPITHE'CUS, a genus of monkeys, natives of the East, having a very long, slender, powerfully muscular, although not prehensile tail. The canine teeth are long, but the molar teeth are more tuberculous than in Gibbons (q. v.) and other allied monkeys, indicating a greater aptitude for vegetable food. With this the structure of the stomach corresponds, which is very remarkable, and different from that of all other animals; consisting of a cardiac pouch, slightly bifid at the extremity; a very wide middle portion, formed of numerous pouches or sacs; and a very long canal, furnished with sacs at its commencement, but simple towards its termination. Professor Owen has been careful, however, to point out that these three portions do not correspond to any of the parts of the stomach of a ruminant animal, not exhibiting any such diversities in their internal surface. The species are numerous. The Entellus (q. v.) Monkey is one of them. Another is the Negro Monkey (*S. Maurus*) of Java, remarkable for its jet-black colour and long silky hair.

SEMOLI'NA (Semola or Semoule), an article of food much used in France and Italy, and to a small extent in Britain, and other countries. It consists of particles of wheat varying in size from grains of sand to small millet. Only the hard-grained wheats of Spain, Odessa, and Southern Italy are adapted for making it; these hard wheats are not easily reduced to flour, and small particles escape being crushed by the mill-stones, and will not pass through the sieves—these constitute semolina. In France, more attention is paid to this article than in any other country; and as it fetches a higher price than flour, the skilful

miller so adjusts his mill-stones as to produce a considerable quantity. The granules of semolina are of various sizes, and they are carefully separated by sieves, the openings of which are from fine to coarse. A favourite kind of bread made of the coarser kinds of semolina—the semoule of the French—is sold in Paris under the name of *gruau*. In Italy, it is used in making polenta, in common with maize, meal, and millet; and in Britain it is used for puddings.

SE'MPACH, a small town of Switzerland, in the canton of Lucerne, and 9 miles by railway north-west of the town of that name, stands on the east shore of the lake of Sempach. It is surrounded with walls, now in a ruinous condition, has a population of a little over 1000, and was one of the outposts of the confederate cantons against their Swabian and Austrian assailants in the 14th century. Under the walls of S. took place the second great conflict of the confederated Swiss cantons with Austria. Leopold's army of 4000 horse and 1400 foot arrived before S. on the 9th July 1396, and found itself unexpectedly opposed by the confederated Swiss to the number of 1300. The nature of the ground being unfitted for the action of cavalry, the knights dismounted, and formed themselves into a solid and compact body, which was at once charged by the Lucerners; but the wall of steel was impenetrable, and not a man of the Austrians was even wounded, while 60 of the bravest of Lucerne with their landamman fell. The mountaineers were beginning to despair of making an impression on their apparently invulnerable opponents, when Arnold von Winkelried, a knight of Unterwalden, seized with a noble inspiration, rushed forward, grasped with outstretched arms as many pikes as he could reach, buried them in his bosom, and bore them by his weight to the earth. His companions rushed over his body into the breach thus made, slaughtered the armour-encumbered knights like sheep, and threw the remainder into the utmost confusion and dismay. The conflict continued in an irregular manner for some time longer, but the result was a decisive victory for the Swiss, who had lost only 200 men; while the loss of the Austrians was ten times as great, including 600 counts, barons, and knights. The body of Duke Leopold, who had throughout displayed the most obstinate valour, was found next day buried among a heap of slain. The anniversary of this great victory is still celebrated by prayer and thanksgiving on the field of battle.

SEMPERVI'VUM. See House-leek.

SENATE. See Rome.

SENA'TUS ACADE'MICUS, one of the governing bodies in the Scottish universities, consisting of the Principal and Professors. It is charged with the superintendence and regulation of discipline, and the administration of the university property and revenues, which last function, since the Universities Scotland Act of 1858, the Senatus exercises subject to the control and review of the University Court. Degrees are conferred by the Senatus through the Chancellor or Vice-chancellor. The Principal is president, and besides his deliberative vote, has a casting vote. In his absence, the senior professor present acts as chairman, who has also a double vote. One-third of the Senatus is required to form a quorum.

SENDOMIR or **SANDOMIR MOUNTAINS.** See Radom.

SE'NECA, M. Annæus, the rhetorician, was born at Corduba (Cordova) in Spain. The time of his birth is doubtful, probably about 61 B.C. He seems to have been in Rome during the early period of the power of Augustus. He was rich, belonged to the equestrian order, and enjoyed the friendship of many distinguished Romans. From Rome he returned to Spain, where he married Helvia, and had by her three sons. The time of his death is uncertain; but he probably lived till the close of the reign of Tiberius, and died in Rome or Italy. His extant works are *Controversiarum Libri X.*, and *Suasoriarum Liber*, neither of which is complete. They are elaborately rhetorical in style, but do little to support the fame of their author, who is more remembered for his prodigious memory than for anything else.

SENECA, L. Annæus, son of the preceding, and a celebrated philosopher, was also born at Corduba, a few years B.C. When a child, he was brought by his father to Rome, where he was initiated in the study of eloquence. He cared more, however, for philosophy, in which his first teacher was the Pythagorean Sotion, whom he afterwards left to follow Attalus the Stoic. He travelled in Greece and Egypt; and, in obedience to his father's wishes, he pleaded in courts of law; but notwithstanding his forensic triumphs, he left the bar from fear of Caligula's jealousy. On entering into public life, he filled the office of questor, and had already risen high in the favour of the Emperor Claudius, when he was accused of an adulterous connection with Julia, the daughter of Germanicus, and wife of Vinicius. He was exiled to Corsica, where he remained for eight years, deriving from philosophy what consolation he could, while incessantly complaining with a by no means philosophic querulousness, and appealing to the emperor for pardon. When Claudius married his second wife, Agrippina, S. was recalled by her influence, raised to the pretorship, and appointed instructor of her son Nero. On the death of his governor and military tutor, Burrus, Nero gave way to his depraved passions with a force which S. could not control. All his influence over his pupil was lost, but he profited by his extravagant bounty to such a degree that his accumulated wealth amounted to 300,000 sestertia, or to £2,421,870 of our money. Nero soon began to look with envious eyes on this fortune; and S., to avert dangerous consequences, offered, with much tact, to refund to the emperor his gifts, and begged leave to retire on a small allowance. This Nero declined; and S., under pretence of illness, shut himself up, and refused to appear in public. Nero then attempted to have him poisoned, but failed. A short time afterwards, Antonius Natalis, when on his trial for participating in the conspiracy of Piso, implicated S. as one of the conspirators. This was quite enough to fix S.'s guilt. He was sentenced to put himself to death. His wife, Paullina, declared her resolution to die with him, and, in spite of his remonstrances, accompanied him into the bath in which, according to his own choice, he was to be bled to death. The emperor, however, would not allow Paullina to die, but removed her from her husband, who gradually expired, 65 A.D. S.'s extant writings are mainly on moral subjects, and consist of Epistles, and of treatises on Anger, Consolation, Providence, Tranquillity of Mind, Philosophical Constancy, Clemency, The Shortness of Life, A Happy Life, Philosophical Retirement, and Benefits. He also speculated on physical phenomena, and wrote seven books entitled *Quæstiones Naturales*, in which he is thought to have anticipated some notions regarded as principles in modern physics. Ten tragedies, ascribed to him by Quintilian, and generally included in editions of his works, have also come down to us; but whether he is really their author remains still a dubious and debated point. Some allege that they were the

work of his father, Seneca the rhetorician; some that they must be attributed to another Seneca. They were not intended, and are certainly not adapted for the stage. They are overcharged with declamation; and, if rich in moral sentiments, are wanting in dramatic life. Of his genuine prose writings, modern opinion takes a divided view; some critics praising his practical sagacity, others finding him wanting in speculative reach. It is perhaps a significant fact, that he is admired by French scholars, and disparaged by German. One of the best editions of the prose works is the Bipontine, 1809; of the tragedies, that of Bothe, 1819.

SENECA LAKE, one of a range of narrow lakes in the western part of the state of New York, U.S. It is 37 miles from north to south, and from 2 to 4 miles in width, 441 feet above the Atlantic, 630 feet deep, and was never known to be frozen over until March 1856. It is navigated by steamboats from its head to the pretty village of Geneva at its mouth, and empties itself by the Seneca and Oswego rivers into Lake Ontario. It takes its name from the Seneca Indians, one of the Six Nations.

SENE'CIO, a genus of plants of the natural order *Compositæ*, suborder *Corymbiferæ*, having a hairy pappus, a naked receptacle, and a cylindrical involucre of linear equal scales, with a few smaller scales at their base. The species are very numerous; annual, perennial, and half-shrubby plants, natives chiefly of the temperate and cold parts of the world, the half-shrubby species being from the warmer latitudes. Eleven species are reckoned as British, and commonly known as Groundsel (q. v.) and Ragwort (q. v.). *S. Saracenicus*, probably not a true native of Britain, but introduced in the middle ages, has undivided lanceolate leaves, and was once in repute as a vulnerary. The FIREWEED of North America is *S. hieracifolius*. It receives its popular name from its appearing abundantly wherever a part of the forest has been consumed by fire. Many species of S. have a strong disagreeable smell. A few are rather ornamental as flowers.

SENE'FFE, or **SENEF**, a town in the province of Hainault, Belgium, about 11 miles north-west of Charleroi, has a pop. of between 3000 and 4000, and is the centre of a district in which manufactures of pottery and glass are extensively carried on. S., however, is chiefly notable for its proximity to the battlefield on which William of Orange (III. of England), at the head of the forces of the coalition against France, was defeated, after a bloody contest, by the Great Condé, 11th August 1674. In William's army there were four lieutenants—Montecuculi (q. v.), Duke Charles of Lorraine, the Prince of Waldeck, and the Prince of Vaudemont, the first three of whom subsequently attained prominence as military commanders. Of the allied forces of 60,000 men, the Dutch lost from 5000 to 6000 men, the Spaniards 3000, and the Imperialists 600; while the French army, which entered into the conflict 30,000 strong, could scarcely muster 20,000 after their victory.—Under the walls of S., Moreau, in 1794, defeated the Austrians.

SE'NEGA or **SNAKE ROOT** is the dried root of *Polygala Senega*. The following are its characters: 'A knobby root-stock, with a branched tap-root of about the thickness of a quill, twisted and keeled; bark, yellowish-brown, sweetish, afterwards pungent, causing salivation; interior, woody, tasteless, inert.' Senega is a powerful and trustworthy stimulating expectorant, and may be advantageously prescribed in the advanced stages of chronic bronchitis and pneumonia, especially when occurring in aged or very debilitated patients. It is also a valuable remedy in prolonged hooping-cough, and in the latter stages of croup and of bronchitis in young children. The preparations are the Infusion and the Tincture; the average dose of the former being an ounce and a half, of the latter a drachm. For children, the powdered root in doses of ten grains is the best form. See POLYGALA.

SENEGA'L (called by the natives *Senaga*), a large river in Western Africa, rises in Mount Cooro, in lat. 10° 30′ N., long. 10° 40′ W., flows first north-west and then west, and falls into the Atlantic after a course of 1000 miles, for the last 740 of which it is navigable for flat-bottomed boats. Here and there, throughout the whole course, the navigation is interrupted by cataracts, shoals, and rocks. In the lower course, the river forms numerous, large, cultivated, and very fertile islands, and its banks are green and productive, and in part clothed with wood. The entrance is difficult on account of breakers and a bar which, in the dry season, is covered by only 8 to 9 feet of water.

SENEGAL, the name of the French possessions on the river Senegal in Senegambia (q. v.).

SENEGA'MBIA, a large maritime tract of country in Western Africa, in lat. about 10°—18° N., long. about 4°—17° 30′ E., is bounded on the N. and W. by the Sahara and Sudan, on the S. by the colony of Sierra Leone, and on the W. by the Atlantic. Area about 400,000 sq. m.; pop. estimated at about 9,000,000. The country takes its name from its two principal rivers, the Senegal and the Gambia. Between these two rivers, which are 250 miles apart, there are no water-courses of any importance, and from the Gambia south to the frontier of Sierra Leone, the only considerable stream is the Rio Grande. The coast is deeply indented by arms of the sea, which resemble the estuaries of rivers. The country forms the western and northern declivity of the plateau of Kong, and part of it is still unexplored. The soil is of two kinds, that of the coasts and that of the interior: the former consisting in part of low flat alluvial plains, and partly of an undulating country, which broadens toward the north, until, on the northern frontier, it merges into the Sahara; while the plateau of the interior rises from the coast plains in mountainous terraces, until it loses itself in the Kong Mountains. Its loftiest elevations are only about 3280 feet high. S. is divided into three districts—High, Middle, and Low Senegambia. The first comprises the country to the north of the Senegal, and is inhabited by Moors, who, of course, profess Islamism. Middle S. comprises the countries bordering the Senegal, having an area of 1350 sq. m., and is inhabited by Negroes, who divide themselves into numerous tribes. Of this tract, the climate is extremely hot, and is unhealthy in the marshy districts. The soil is generally fertile, and yields the crops usually produced in the hot regions of Africa. Low S. comprises the countries bordering the Gambia, and extends south to Nunez. Of the coast-regions of S., France possesses on the banks and around the estuary of the Senegal about 1440 sq. m. of territory; the Portuguese, a tract of 35,437 sq. m., on and around the estuary of the Rio Grande; and the English some little territory on the Gambia.

SE'NESCHAL (Teuton. *sene-scalc*, senior servant?), in the origin of the office, probably an attendant of the servile class who had the superintendence of the household of the Frankish kings. In the course of time, however, the seneschalship rose to be a position of dignity, held no longer by persons of servile race, but by military commanders, who were also invested with judicial authority. The

lieutenants of the great feudatories often took the title of seneschal. A similar office in England and Scotland was designed steward, but is rendered into Latin as *senescallus*.

SENIOR, NASSAU WILLIAM, political economist, born 1790, eldest son of Rev. J. R. Senior, vicar of Durnford, Wilts, was educated at Eton, and Magdalen College, Oxford, where he graduated in 1811, taking a distinguished first-class in classics. In 1819, he was called to the bar at Lincoln's Inn. In 1825, he was elected to the professorship of Political Economy at Oxford, founded by the late Henry Drummond, M.P. He held it for the statutory term of five years, and was succeeded by Mr Whately, afterwards Archbishop of Dublin. In 1832, the enormous evils of the poor-law administration in England led to the appointment of a Commission of Inquiry. S. was one of the commissioners; and the portion of the Report in which the abuses of the existing system were detailed, was drawn up by him. This Report encouraged the Whig government to bring in the Poor-law Amendment Act of 1834. See POOR AND POOR LAWS. In 1836, he received the appointment of Master in Chancery; and in 1847, was re-elected to his former professorship for another term of five years. More recently, he was nominated one of the commissioners of National Education, under the presidency of the late Duke of Newcastle. His publications, which are numerous, comprise various excellent treatises on political economy, some of which were delivered in the form of lectures at Oxford, and several pamphlets on social and political questions. He also contributed numerous articles to the *Edinburgh Review*, and other leading periodicals. He has left some interesting journals of his visits to Turkey and Greece, and observations on the political and social condition of these countries. His *Essays on Fiction*, contributed to the chief reviews between the years 1821 and 1857, and republished in 1864, relate principally to the novels of Scott, Bulwer Lytton, and Thackeray. He analyses the plots, and classifies the characters of the Waverley novels with curious felicity, and devotes a masterly essay to Thackeray, whom he regards as the greatest novelist of his day. The intellect of S. was clear and penetrating, and the perspicuity of his style made him an able expositor of the truths of political and social science. His article on 'Political Economy' in the *Encyclopædia Metropolitana*, and his remarks on some definitions in this science, published in the appendix to Dr Whately's treatise on *Logic*, may be consulted with advantage. He died June 4, 1864.

SENLIS, a very ancient town of France, dep. of Oise, 33 miles north-north-east of Paris. Its older portion is surrounded by walls, flanked with 16 towers, which are all that remain out of the 28 towers of early times. The cathedral, a small edifice, is a beautiful example of early Gothic. Manufactures of cloth, lace, and thread are actively carried on. Pop. (1862) 5198.

SENNA is one of the most important purgatives contained in our Materia Medica. Two sorts of senna are recognised in the Pharmacopœia—viz., Alexandrian senna and Tinnevelly senna. The Alexandrian senna leaves are chiefly obtained from *Cassia lanceolata*, while the Tinnevelly senna leaves are yielded by *Cassia elongata*. *Alexandrian senna* is chiefly grown in Nubia and Upper Egypt, and is imported in large bales from Alexandria. It is apt to be adulterated largely with the flowers, pods, and leaves of *Cynanchum arghel* and *Tephrosia apollinea*. *Tinnevelly* or *East Indian senna* in odour and taste entirely resembles Alexandrian senna. The leaflets are, however, 'about two inches long, lanceolate, acute, unequally oblique at the base, flexible, entire, green, without any admixture.'

Senna is, as Dr Christison observes in his *Dispensatory*, 'so certain, so manageable, and so convenient a purgative, that few remedies of its class are held in equal estimation. In point of energy, it holds a middle place between the mild laxatives and drastic cathartics. It acts chiefly on the small intestines, increasing their mucous secretion, as well as their peristaltic motion, and producing loose brown evacuations.' The drawbacks to its more universal administration are its disagreeable taste, and its tendency to produce nausea, griping, and flatulence; the means of correcting which are subsequently noticed. The only circumstance positively contra-indicating its employment is an inflammatory state of the intestinal mucous membrane. Although senna has been frequently submitted to chemical analysis, its active principle is not known; but whatever the cathartic principle may be, it is obviously absorbed into the circulation before it begins to operate, since this drug imparts a purgative property to the milk of nurses.

The following are the most important preparations of this medicine:

1. *Infusion of Senna*, which is obtained by infusing for one hour, and then straining, half an ounce of senna and half a drachm of sliced ginger in half a pint of boiling water. The taste of this infusion is much concealed by the addition of some black tea, or what Neligan finds 'still better, coffee, and it may be sweetened with sugar, and milk added; it is in this way readily taken by children.' The addition of neutral laxative salts checks the griping, which is often caused by senna alone, and at the same time increases its activity. The ordinary *Black Draught* is commonly prepared by adding one ounce of sulphate of magnesia to four ounces of infusion of senna. Two or three ounces of this mixture, to which a drachm each of the tinctures of senna and of cardamoms may be added, usually act as a very useful aperient.

2. *Tincture of Senna*, composed of senna, raisins, caraway seeds, and coriander seeds macerated in proof-spirit, and formerly known as *Elixir Salutis*, or *The Elixir of Health*, is seldom given alone. Christison recommends a mixture of an ounce of the tincture of senna with an ounce and a half of sulphate of magnesia, dissolved in four ounces of water, and as much infusion of roses. 'A wine-glassful of this given every hour seldom fails to act with energy, and without sickness or tormina, and is an excellent combination for most febrile disorders.' The tincture is, however, most commonly prescribed in doses of one or two drachms, as an adjunct to other cathartic mixtures, to correct their griping properties.

3. *Confection of Senna*, commonly known as *Lenitive Electuary*, is a pulpy mixture of powdered senna with powdered coriander seeds, figs, tamarinds, cassia pulp, prunes, extract of liquorice and sugar; all of which substances are, under certain specified conditions, combined by the action of boiling water. When properly prepared, which is often not the case, it forms a mild aperient, well suited for persons suffering from piles.

In the above preparations, it is immaterial whether Alexandrian or East Indian senna is employed.

The senna leaves of commerce and of medicine are the produce of several species of *Cassia* (q. v.), natives of India, Arabia, Syria, and the north of Africa. *Cassia obovata* is a perennial herbaceous

plant 1—2 feet high, having smooth leaves, six or seven pair of obovate obtuse leaflets, racemes of yellow flowers, and curved, compressed pods, with an interrupted ridge along the middle of each valve. It is found in Egypt and Nubia, and is now also cultivated in Italy, Spain, the West Indies, &c.—*C. acutifolia* is a half-shrubby plant, about two feet high, with racemes of yellow flowers, lanceolate acute leaves, and flat elliptical pods, somewhat swollen by the seeds. It grows in the deserts near Assouan, and the leaves are collected by the Arabs, and carried by merchants to Cairo for sale.—*C. elongata* is an annual with erect, smooth stem; narrow leaves, with 4—8 pair of lanceolate leaflets, which are rather downy beneath; racemes of yellow flowers; and oblong pods, quite straight, rounded at the apex, and tapering to the base. It grows in India.—*C. Æthiopica* is about 18 inches high, with 3—5 pair of oval-lanceolate, downy leaflets; the pods flat and smooth. It grows in the north of Africa.—*C. lanceolata* is an Arabian species, differing from the others in its erect pods.—All these seem to furnish the officinal senna. Linnæus, not aware of the diversity of species, assigned it to one which he named *C. Senna*, but it would be hard to say which has a preferable claim to this name. All the species have the leaflets unequal-sided, by which they are readily distinguished from other leaflets often used for the adulteration of senna, as those of *Argel* (q. v.) and *Bladder Senna*. The commercial names of the different kinds of senna do not seem in general to correspond with differences of species, but rather to refer to the countries or ports from which they are brought.

BLADDER SENNA (*Colutea*) is a genus of shrubs of the natural order *Leguminosæ*, suborder *Papilionaceæ*, having pinnated leaves, red or yellow flowers, and remarkably inflated pods, whence the English name. One species (*C. arborescens*) is common in shrubberies in Britain. It is a native of the south of Europe, and is found on the ascent of the crater of Mount Vesuvius—almost the only plant that exists there.

SENNAA'R, a negro state in the south part of Nubia (q.v.), extends from about lat. 15° 30' to about 12° N., on both sides of the Bahr-el-Azrek, or Blue Nile. Its capital, *Sennaar*, was once an important trading town, but its population has sunk within the last century to about 4000.

SENNA'CHERIB, an Assyrian king, son of Sargon, reigned 702—680 B. C. The interest attaching to his name is principally due to the extraordinary and incomprehensible disaster that befell his army, either at Libnah or at Pelusium, when no fewer than 185,000 Assyrians are said to have been slain by the 'angel of the Lord' (see HEZEKIAH). The Egyptian account of this mysterious affair (reported by Herodotus, book ii. 141), and that of Berosus the Chaldæan, quoted by Josephus (*Antiq. of Jews*, book x. chap. 1), as well as the scriptural narrative (2 Kings, chap. 18) justify us in believing that S. at least sustained a sudden, unexpected, and terrible overthrow, which forced him to retreat in hurried confusion to his own country. All that we know of his subsequent history is, that he was assassinated by his sons while worshipping his favourite god. The discrepancies, both as regards dates and names in the life of S., between the writer of Kings and profane historians, are felt even by strenuous apologists, like the Rev. George Rawlinson, to be almost, if not altogether irreconcilable. S. belongs to that showy class of eastern monarchs whose rule is commonly described as 'magnificent'—i. e., he built great palaces, and erected monuments in the different parts of his empire, and everywhere left an impression of his grandeur. In Scripture, in Herodotus, in Josephus, S. is the 'Great King.' His most imperial work was the palace at Koyunjik, which covered a space of more than eight acres, and was richly adorned with sculpture.

SENS, an old town of France, in the dep. of Yonne, 70 miles south-east of Paris, stands amid pleasing scenery on the right bank of the Yonne. The town proper is surrounded by walls, chiefly of Roman construction, and in the vicinity, the remains of ancient roads and of Roman camps abound. The spacious and handsome Gothic cathedral is the principal edifice. An active trade in wines, grain, hemp, wool, and timber is carried on. Pop. (1862) 10,322.

SENSA'TION (in Physiology) may be defined to be 'the perception by the mind of a change wrought in the body.' According to this definition, which is borrowed from Dr Todd, sensation involves—first, a bodily change from some cause, whether inherent or external; and secondly, a mental change, whereby the perception of the bodily change is accomplished. The true organ of sensation is the brain, and especially that portion of it which (to use the words of the above-named eminent physiologist) constitutes the centre of sensation, and extends into the spinal cord, forming the posterior horns of its gray matter. See SPINAL MARROW. Physiologists distinguish between *common* and *special* sensation. Common sensation exists in the skin, and in all parts of the body to which ordinary sensory nerves are distributed, and is excited by ordinary mechanical or chemical stimuli; while special sensation is exemplified in the special senses of vision, hearing, &c. For the due action of the latter, there are organs of special sensation, which, by the peculiar character of the nerves with which they are supplied, become the recipients of impressions of a particular kind; thus, the eye is sensible to light, the ear to sound, &c.; and if the special nerves going to these organs be irritated, instead of pain being excited, as in the case of an ordinary sensory nerve, there is a feeling closely allied to that which would be excited by the application of the normal stimulus, as light, sound, &c. Any *ordinary* sensibility those organs (the eye, ear, &c.) possess is dependent on ordinary sensory nerves, and is quite independent of the nerves of special sense.

In works on the physiology of the nervous system, we often meet with the phrases *objective sensation*, *subjective sensation*, and *reflex sensation*. We shall conclude this article by a brief description of the meaning of these terms. 'In the ordinary mode of exciting sensations,' says Dr Todd, 'the presence of an object is necessary. This object creates an impression on the peripheral parts of the sensitive nerves; and the change caused by this impression being duly propagated to the centre of sensation, is perceived by the mind.' This, which is the ordinary form of sensation, is termed an *objective* sensation, in opposition to a so-called *subjective* sensation, in which a mental act can develop a sensation independently of any present object. These subjective sensations are sometimes excited by the mind recalling, more or less exactly, the presence of an object; but in many cases they are caused by physical changes in the nerves themselves, owing to an excess or deficiency of blood, or some other pathological causes. Thus disordered conditions of the retina or optic nerve may give rise to motes or flashes of light; disturbance of the auditory nerve occasions singing in the ears, the sound of distant bells, &c.

To understand the mode in which *reflex* sensations

are brought about, an acquaintance with *reflex action*, described in the article NERVES AND NERVOUS SYSTEM, is requisite. As examples of this form of sensation may be mentioned the facts, that the irritation of a calculus in the bladder will give rise to pain in the thighs; that diseased liver often excites pain in the shoulder-joint; and that ice or iced drinks suddenly introduced into the stomach, occasion intense pain in the forehead. For further information on the subject, the reader is referred to Dr Todd's article 'Sensation,' in the 4th vol. of his *Cyclopædia of Anatomy and Physiology*.

SENSATION, a name of great import in the Philosophy of Mind, as well as familiar in ordinary speech. In the mental process so named, there is a concurrence of many contrasting phenomena, rendering the word ambiguous, and occasioning verbal disputes.

1. In Sensation, there is a combination or concurrence of physical facts with a mental fact, and the name is apt to be employed in expressing either side. Thus, in sight, the physical processes are known to be—the action of light upon the globe and retina of the eye, a series of nerve-currents in the brain, and a certain outgoing influence to muscles and viscera; these are accompanied by the totally different phenomenon termed the feeling, or the mental consciousness of light. It is to the last fact, the mental fact, that the name Sensation is most correctly applied; but there is a natural liability to make it include those physical adjuncts which are inseparable from the mental manifestation.

2. In the still more comprehensive contrast of Mind and the External or Extended World, both members may be designated under Sensation. One and the same situation on our part may contain a strictly mental or *subjective* experience—pleasure or pain, for example—and an *objective* experience, or a recognition of the extended world, as distinct from mind. In looking at a fine prospect, both facts concur in fluctuating proportions; we have a feeling of pleasure (mind or subject) and a knowledge of the outspread or extended world (object), which is what affects us in the same way at all times, and affects all minds alike. As before, sensation is most properly used to express the strictly mental or subjective experience, the pleasure or pain, while the 'Perception' should be applied to express the objective experience. See PERCEPTION.

3. In Sensation, a past experience recovered by memory is inextricably woven with the present impression, a circumstance which confuses the boundary-line between Sense and Intellect. The sensation that the full moon gives rise to is not solely owing to the present effect of the moon's rays on the organs of vision; the present effect revives or restores the total ingrained impression of the moon consequent on all the occasions when we have observed it. Again, it is impossible for us to have a sensation without a more or less complex feeling of difference or discrimination, which property is a fundamental fact of intellect. Our sensation of the moon supposes a contrast of the white light with the adjoining blue, of the round form with other forms, of the broad disc with a starry point, and so on. Thus, in Sensation we have a concurrence of all three processes of the intellect—Retentiveness, Agreement, and Difference. Sensation without Intellect is a mere abstraction; it is never realised in fact.

This last remark has important bearings upon the question as to the origin of our knowledge. It has been disputed whether or not our ideas are wholly derived from Sense. Now, seeing that there is no such thing as Sense to the exclusion of Intellect, the question ought to be enlarged and put in this form: Are our ideas wholly derived through Sense in conjunction with the intellectual processes, or are there any ideas that are not or cannot be so derived? When it is alleged, by Cudworth, Price, and others, by way of maintaining the doctrine of Innate Ideas, that Likeness, Unlikeness, Equality, Proportion, &c., are not obtained from sense, the answer is, that their origin may in all probability be accounted for by Sense co-operating with the well-known powers of the Intellect, and that, until the conjunction of the two is proved insufficient, the theory of an Intuitive origin is not called for.

SENSES. Referring for an account of the several senses to their respective designations, we will here endeavour to state what faculties or sensibilities of the mind are properly included under the name.

The common reckoning includes the Five Senses —Taste, Smell, Touch, Hearing, Sight—but this is not now considered exhaustive or complete.

For example, the feelings of Hunger, Thirst, Suffocation, Internal Warmth and Chillness, &c., have all the characters implied in an ordinary sensation: they are the result of some External Agent acting on a distinct bodily organ, and giving rise to Feeling, sometimes pleasurable and sometimes painful. In order that these states, related to the sensibility of the different viscera, may find a place among the Senses, they have been grouped under one general head, and designated 'Sensations of Organic Life.' They are of great importance as regards our enjoyments and our sufferings, although not contributing much to our knowledge or intelligence. They approach nearest to Taste and Smell, the more emotional senses, and are at the furthest remove from the intellectual senses—Touch, Hearing, and Sight.

Again, the feelings connected with our Activity, or with the exercise of the muscular organs—as the pleasures of exercise and rest, the pains of fatigue, the sensibility to weight, resistance, &c.—were, until lately, overlooked in the philosophy of the mind. When they began to be recognised, it was common to treat them as a sixth sense, called the Muscular Sense. But this does not represent their true position. They do not arise from external agents operating on a sensitive part, but from internal impulses proceeding outwards to stimulate the muscular energies, and to bring about movements; they are thus the contrast of the senses generally. Sense is associated with the *ingoing* nerve-currents, Movement with the *outgoing*. The contrast is vital and fundamental; and accordingly, the Feelings of Movement and Muscular Strain should be considered as a genus distinct from the genus Sense, and not as a species of that genus.

The classification of the fundamental sensibilities of the mind would then stand thus: I. Feelings of Muscular Energy. II. Sensations of the Senses, 1. Organic Life; 2. Taste; 3. Smell—Emotional: 4. Touch; 5. Hearing; 6. Sight—Intellectual.

SENSIBI'LITY is a term somewhat vaguely used by physiologists. Until a comparatively recent period, it was often confounded with Irritability, although Haller, more than a century ago, very clearly laid down the distinction between these two properties of tissues. We not unfrequently find it applied to nerves, to signify their power of evolving nervous force, but Excitability (as Dr Todd observes) more exactly implies what is meant in this case. The term should be limited to signify the power which any part of the body possesses of causing changes, inherent or excited in it, to be perceived by the mind; and the greater this power is, the greater is the sensibility of the part. The degree of sensibility of different parts of the outer

surface of body is very various. The relative sensibility has been ascertained by Weber by touching the surface with the points of a pair of compasses tipped with cork, and then (the subject's eyes being closed) by approximating the points until they were brought within the smallest distance at which they could be felt to be separate. The following are a few of his results: point of tongue, ½ a line; tips of fingers, 1 line; red surface of lips, 2 lines; palmar surface of 2d phalanx, 2 lines; palmar surface of metacarpus, 3 lines; tip of the nose, 3 lines; palm of the hand, 5 lines; dorsum of the hand, 8 lines; vertex, 15 lines; skin over the spine and the middle of the thigh, each 30 lines: so that the sensibility of the skin is at least sixty times greater in some parts than in others.

SE'NSITIVE PLANT, a name commonly given to certain species of *Mimosa* (see MIMOSEÆ), on account of the peculiar phenomena of Irritability (q. v.) which their leaves exhibit in their collapse when touched or shaken. Numerous species of *Mimosa* possess this property, and, indeed, most of the species in a greater or less degree; but those in which it is most conspicuous are humble herbaceous or half-shrubby plants. They have leaves beautifully divided, again and again pinnate, with a great number of small leaflets, of which the pairs close upwards when touched. On repeated or rougher touching, the leaflets of the neighbouring *pinnæ* also close together, and all the pinnæ sink down, and at last the leaf-stalk itself sinks down, and the whole leaf hangs as if withered. If the stem is shaken, all the leaves exhibit the same phenomena. After a short time, the leaf-stalk rises, and the leaflets expand again. On account of this curious and interesting property, some of the sensitive plants are frequently cultivated in our hot-houses. They are generally treated as annuals, although capable of longer life. *M. sensitiva*, one of the best known species, is a native of Brazil, with prickly stems and leaf-stalks, and small heads of rose-coloured flowers. *M. pudica* has a herbaceous stem, bristly, but not prickly. *M. casta*, *M. pudibunda*, *M. palpitans*, and *M. viva*, are also among the most sensitive species.

SENSO'RIUM. This term is applied by physiologists to a series of ganglionic centres, each of which has the power of communicating to the mind the impressions derived from the organ with which it is connected, and of exciting automatic or involuntary muscular movements in respondence to these sensations. (See Carpenter *On the Functions of the Nervous System in Human Physiology*, 6th ed. p. 545.) These ganglionic centres, which lie at the base of the brain in man, are in direct connection with the nerves of sensation, and appear to differ entirely in their functions from the other parts of the encephalon. Anterior, there are the *olfactive* ganglia, or what are termed the bulbs of the olfactive nerves. The ganglionic nature of these structures is more evident in many of the lower mammals, in whom the organ of smell is highly developed, than it is in man, although even in the human subject these masses contain gray or vesicular nervous matter, indicating their true ganglionic nature. Behind these, we have the *optic* ganglia, commonly known as the corpora quadrigemina, small in man, but comparatively large in many of the lower mammals. The *auditory* ganglia do not form distinct projecting masses, but are represented by small masses of vesicular matter, into which the auditory nerves may be traced, and which are imbedded in the medulla oblongata. In fishes, there is a well-developed and distinct auditory ganglion. The *gustatory* ganglion is the least distinct of any, but it is supposed to be represented by a mass of vesicular matter embedded, like the preceding ganglion, in the medulla oblongata, and into which the nerves of taste may be traced. On examining a progressive series of brains from man to the lowest mammals, we find a continuous diminution of the hemispheres, and a corresponding development of these ganglia, or, at all events, of the olfactory and optic ganglia; while, if we continue the investigation to the brains of birds, reptiles, and fishes, we find the same law in force, till finally, in reptiles and fishes, these ganglia form the greatest part of the brain.

It was long attempted to determine some one point in the brain where the soul is more especially located or centralised; and to this ideal point the name of Sensorium was applied in the older psychological speculations. The fancy of Descartes made it a small body near the base of the brain, called the 'pineal gland.' The recent views of the nervous system repudiate the idea of a central point of this nature; in consciousness, the brain generally is active, although, under different impressions and ideas, the currents may be presumed to follow different nerve-tracks. Consequently, no meaning is now attached to a sensorium in psychology, as distinct from the cerebrum at large.

SENTENCE. A sentence is the form of words in which a thought or a Proposition (q. v.) is expressed. A mere phrase or group of words, such as, 'A very high mountain,' which only conveys a meaning or calls up an idea, but does not make an affirmation, is not a sentence. Since speech is the expression of thought, the sentence is the proper unit or integer of speech, and thus forms the starting-point in the study of language.

Every single sentence is made up of two parts—the one naming the subject, or the something that is spoken about; the other the predicate, or the something that is said of it—as, 'The sun—shines;' 'Those who have the greatest gifts, and are of the greatest usefulness— are the most humble.' Every sentence must contain a finite verb, as it is the function of the Verb (q. v.) to make affirmations. 'The sun shines.' is an example of a sentence in its barest form, containing merely the subject 'sun,' and the predicate 'shines,' which are called the *principal* elements. The enlargement or development of the sentence takes place by means of adjuncts, or *secondary* elements, tacked on to the principal elements—as, '*Young* birds build *nests without experience*.' Sentences may be divided into simple, compound, and complex.

1. A simple sentence has only one subject and one finite verb. Reduced to its essentials, it is of the form, 'The sun shines;' 'The day is cold.' 2. A compound sentence consists of two or more simple sentences combined—as, 'The sun gives light by day, and the moon by night;' which contains two affirmations or sentences, 'The sun gives light by day,' and 'The moon gives light by night.' 3. A complex sentence consists of one principal sentence together with one or more dependent sentences. In the compound sentence given above, there are two distinct statements, and as both are put on the same footing, they are said to be *co-ordinate* sentences. But when we say, 'The moon rose as the sun went down,' the going down of the sun is not mentioned on its own account; the only thing directly affirmed is that the moon rose at a certain time, and the going down of the sun is only introduced as marking that time. Such clauses are called *subordinate* sentences (see CONJUNCTIONS). The subordinate clauses of complex sentences may be considered as transformations of the elements of the simple sentence; and according to the nature of the element which has been transformed, they

might be called noun-sentences, adjective-sentences, or adverbial sentences—e. g., '*The existence of God* is denied by none' = '*That God exists*, is denied by none.' '*Benevolent* men are happy' = 'Men *who seek the good of others* are happy.' 'The moon rose *at sunset*' = 'The moon rose *as the sun went down.*' Further, the nouns, adjectives, and adverbs that enter into a subordinate sentence, may, one and all of them, be transformed in their turn into sentences, which will thus be subordinate in a still higher degree—e. g., 'Europe rejoiced *that Greece was delivered from that oppressive power*' = 'Europe rejoiced *that Greece was delivered from the power that had oppressed her.*' Here the adjective *oppressive* in the first sentence has in the second been converted into a sentence which is directly dependent, not on the principal sentence (Europe rejoiced), but on the subordinate, and is therefore subordinate in the second degree. Subordination is seldom carried beyond the second or third degree, as it becomes perplexing, and weakens the force of the principal assertion. The same sentence is often compound, as containing two or more co-ordinate sentences, and at the same time complex, as containing one or more subordinate sentences in addition; and to discriminate all these and point out their relations, is to give the syntactical analysis of the sentence.

SE'NTINEL, SENTRY (from the Lat. *sentire*, to feel or perceive, through the Ital. *sentinella*), a private soldier, marine, or sailor, posted at a point of trust, with the duty of watching the approach of an enemy, or any person suspected of hostile intentions. Sentries mount guard over dépôts of arms, the tents of commanding officers, &c. During the night, each sentry is intrusted with the 'word,' or countersign; and no person, however exalted in position, may attempt to approach or pass him without giving that as a signal. In such case, the sentry is bound to arrest the intruder, and, if necessary, to shoot him. It has happened before now that the commander-in-chief of an army has been prisoner in the hands of one of his own sentries. When an army is in the field, the sentries are its eyes, for they guard the approaches in every direction some distance in front of the main body of troops. In the event of attack, they g[illegible] the alarm, and retire slowly on their supports. There is usually an agreement, tacit or expressed, between commanders that their outlying sentries shall not fire upon one another, which would only be productive of useless bloodshed. Under martial law, death is the penalty to a sentry for sleeping on guard.

SE'NZA SORDI'NO (Ital. without the mute, or without the damper), a musical term, which, when applied to the violin or violoncello, denotes that the Mute (q. v.) is to be removed. In pianoforte music, it means that the performer must press down the pedal which takes off the dampers.

SEPAL. See CALYX.

SEPARATE ESTATE is the legal term denoting the property of a married woman, which she holds independently of her husband's interference and control. Where a marriage is about to be entered into, and the lady has property, it is usual, before the marriage, for her to assign and convey to trustees all or part of her property, so that it may continue to be vested in them for her exclusive benefit, and so that she may be able to deal with it in much the same manner as if she were not married. The deed in that case entirely regulates the extent of her rights. Where the deed has been properly executed, she can draw the interest, and do what she pleases with it. A third party who bequeaths property to a married woman, may also so give it as to make it separate estate. If there is no clause in the deed or will prohibiting alienation or anticipation, she will be able to dispose of her life-interest. She can, in general, alienate her separate estate without the husband's consent; and she is not bound out of it to maintain the husband, even though he may be destitute; nor is she bound to maintain her children, unless the latter would otherwise be chargeable to the parish. When a wife incurs debts and liabilities, her separate estate will become chargeable with these, unless she was at the time acting only as the agent of the husband, such as ordering necessaries for the house. In Scotland, a wife is bound out of her separate estate to maintain a destitute husband, and the husband's consent is necessary to her alienation of the separate estate.

SEPARATION of married persons is either judicial or voluntary. If the parties enter into a deed, or other arrangement, to live separate, this is called a voluntary separation, and, in general, the legal rights of the parties are not altered, except that if the wife is provided with maintenance, she has no longer an implied authority to bind the husband. And though voluntary separation is not encouraged by courts of law, yet effect will be given frequently to deliberate contracts of this kind entered into between the parties. See JUDICIAL SEPARATION.

SE'PARATISTS. See QUAKERS, OATH.

SE'PIA AND SEPI'ADÆ. See CUTTLE-FISH.

SEPIA, a pigment used as a water-colour. It is prepared from the secretion of a peculiar organ, called the ink-bag, found in the Dibranchiate *Cephalopoda*, or Cuttle-fishes. This secretion is black at first, and insoluble in water, but extremely diffusible through it; it is therefore agitated in water to wash it, and then allowed slowly to subside, after which the water is poured off, and the sediment, when dry enough, is formed into cakes or sticks. In this state it is called 'India Ink.' If, however, it is dissolved in a solution of caustic potash, it becomes brown, and is then boiled and filtered, after which the alkali is neutralised with an acid, and the brown pigment is precipitated and dried: this constitutes the proper sepia. It is usually prepared in Italy, great numbers of the species which yields it most abundantly, *Sepia officinalis*, being found in the Mediterranean. The black kind, called India Ink, is prepared in China, Japan, and India, and forms the common writing-ink of those countries.

SE'POY, corrupted from the Indian word *sipahi*, a soldier. This word sipahi, in its more familiar form of *spahis*, is known in most eastern armies; and is itself derived from *sip*, a bow and arrow, the ordinary armament of an Indian soldier in ancient times. The word sepoy now denotes a native Hindu soldier in the British army in India. See EAST INDIA ARMY. The present sepoy force does not exceed 80,000.

SEPS. See SKINK.

SEPTA'RIA are ovate flattened nodules of argillaceous limestone, internally divided into numerous angular fragments by reticulating fissures radiating from the centre to the circumference, which are filled with some mineral substance, as carbonate of lime or sulphate of barytes, that has been infiltrated subsequent to their formation. The fissures have been produced by the cracking of the nodule when drying. They are largest and most numerous in the centre, and gradually decrease outwards, shewing that the external crust had first become indurated, and so, preventing any alteration in the size of the whole mass, produced wider rents

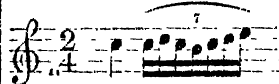
as the interior contracted. The radiating figure, and the striking contrast between the dark body of argillaceous limestone and the more or less transparent sparry veins, when the nodule is cut and polished, has caused them to be manufactured into small tables and similar objects. They are, however, most extensively employed in the manufacture of cement. As they are composed of clay, lime, and iron, they form a cement which hardens under water, and which is known commercially as Roman cement, because of its properties being the same as a famous hydraulic cement made of ferruginous volcanic ash brought from Rome. Septaria occur in layers in clay deposits, and are quarried for economical purposes in the clays of the London basin. Large numbers are also dredged up off Harwich, which have been washed out of the shore-cliffs by the waves. The nodules generally contain a scale, shell, plant, fruit, coprolite, or some other organic substance, forming the nucleus that has apparently excited the metamorphic action which withdrew from the surrounding clay the calcareous and ferruginous materials scattered through it, and aggregated them around itself.

SEPTE'MBER (Lat. *septem*, seven) was the 7th month of the Roman calendar, but is the 9th according to our reckoning, though we preserve the original name. Various Roman emperors, following the example of Augustus, who changed 'Sextilis,' the sixth month of the Roman calendar, into 'Augustus' (August), attempted to substitute other names for this month, but the ancient appellation continued to hold its ground. The Saxons called it *gerst-monath*, or barley-month, because barley, their chief cereal crop, was generally harvested during this month. It has always contained 30 days.

SEPTE'MBRISTS, SEPTEMBRI'SERS (Fr. *Septembriseurs*), the name given to the frantic executioners in what are known as the 'September massacres' in Paris. The particular causes of this ferocious outburst were twofold- mad fear of domestic traitors and of foreign despots. The news came pouring into Paris, ever more and more maddening, of Prussian and Austrian hordes marching victorious over the frontiers; insolent royalists obtruding themselves in the van of the invading armies, and breathing threatenings and slaughter; while numerous *aristocrates* (i. e., favourers of the king and court) were believed to be making preparations to receive them in Paris. At the very same moment broke out the royalist insurrection in *La Vendée*, rendering France still further delirious, whereupon Danton, 'minister of justice,' got a decree passed, August 28, 1792, ordering domiciliary visits for the arrest of all suspected persons, and for the seizure of arms of which patriotic France stood much in need. Upwards of 2000 stand of arms were got in this way, and 400 head of new prisoners. On the morning of September 2, the news of the capture of Verdun by the Prussians arrived. The mingled rage and panic of the people cannot be described. All the bells in Paris were set a-clanging; men and women hurried in myriads to the *Champ de Mars* to get themselves enrolled as volunteers. Danton entered the legislature —'the black brows clouded, the colossus-figure tramping heavy, grim energy looking from all features of the rugged man'— and made that famous speech, ending: 'Pour les vaincre, pour les atterrer, que faut-il? De l'audace, encore de l'audace, et toujours de l'audace.' The effect was electrical. He obtained from the Assembly a decree condemning to death all 'who refused to march to the frontiers or to take up arms.' But patriotism against foreigners was not enough. Were not the traitors at home deserving of death? Marat thought so: multitudes of ardent frantic men and women shared his conviction; but it is not proved that either Marat or Danton formally ordered the massacres, or, indeed, that anybody ordered them. They were rather the spontaneous outburst of patriotic insanity, beholding aristocratic treachery and plots everywhere. Priests, Swiss soldiers, aged and infirm paupers, women both reputable and disreputable, and criminals, were mercilessly cut down or shot. From Sunday afternoon till Thursday evening the wild butchery went on at the Bicêtre, the Abbaye, the Convent of the Carmelites, the Conciergerie du Palais, the Grand Châtelet, St Firmin, La Force, and the Salpêtrière. One gathers a glimpse of the savage sincerity of the Septembriseurs when one reads that the gold rings, watches, money, &c. found on the persons of the massacred were all religiously brought to the town-hall; not a single thing was stolen or furtively appropriated until after the essential work was done. Then the roughs or blackguards ('sons of darkness,' as Carlyle calls them) sallied out into the streets like Mohawks or Alsatians, and commenced to plunder, but were speedily suppressed and forced back into their dens.

Great misapprehension prevails as to the numbers who perished in these fearful scenes. Royalist pamphleteers and others, trusting mainly to fantasy (according to Carlyle, *Fr. Rev.*, vol. ii. p. 158), reckon the victims at 3000, 6000, and even 12,000; but the accurate advocate Maton (who was in the thick of the horrors, and narrowly escaped the guillotine) reduces the number, by 'arithmetical ciphers and lists,' to 1089, which, be it observed, included numbers of forgers of assignats, and other criminals. It was a sad and horrible affair, as all massacres are; but it is above all things desirable to know exactly the *dimensions* of, and the motives that stirred the actors in, so execrable a tragedy.

SEPTIMOLE, in Music. When a note is divided into seven instead of four parts—for example, a minim into seven quavers, or a crotchet into seven semiquavers—the group is called a septimole, and the figure 7 is generally placed over it.



A septimole may also occur in a $\frac{6}{4}$ measure, in which case the seven notes are collectively of the value, not of four, but of six.

SEPTUAGE'SIMA SUNDAY (Lat. *Septuagesima*, 'the seventieth'), the third Sunday before *Lent* (q. v.), so called, like 'Sexagesima' and 'Quinquagesima,' from its distance, (reckoned in round numbers) before Easter.

SE'PTUAGINT (Gr. *Hoi tōn O*, or *hoi O*; Lat. *Septuaginta*; Seventy, LXX., Alexandrine version, &c.), the most ancient Greek translation of the Old Testament that has come down to us, and the one commonly in use among the Jews at the time of Christ. Its origin is shrouded in deep obscurity. The principal myth about it—repeated by Philo, Josephus, the Talmud, and the Church Fathers (Justin, Clement of Alexandria, Epiphanius, and the rest), with individual variations—is contained in a letter purporting to be written by a Greek, Aristeas, to his brother, Philokrates, during the reign of Ptolemy Philadelphus (284—247 B. C.). This king, it is stated, anxious to embody in a collection of laws of all nations on which he was engaged, also those of the Jews, invited, by the advice of his librarian, Demetrius Phalereus, 72 men of learning and eminence from Palestine, who performed the task of translation

(on the isle of Pharos) in 72 days. The facts upon which this legend—utterly rejected now as a piece of history—rests, cannot well be ascertained now. So much, however, seems clear from another anterior testimony (Aristobulos), that Ptolemy, aided by Demetrius, did cause a Greek version of the Pentateuch to be executed, probably during the time of his being co-regent of Ptolemy Lagi. That the translator or translators, however, were not Palestinian but Egyptian Jews, appears equally clear both from the state of the text from which the translation must have been made, and from the intimate acquaintance with Egyptian manners and customs which it evinces. This text differs, especially in the Pentateuch, considerably from our received text, but agrees in many instances with the Samaritan (q. v.). The question of the number of translators has been much and warmly discussed, but with little positive result. So much only seems certain, that different hands were employed in the rendering of the different parts of the Pentateuch, upon which infinite care was bestowed, as well as of the other books of the Old Testament, which, indeed, do not seem to have been done at the same time. In some instances, it would appear as if the translation had been made before the non-pentateuchial books were united with the others into one canon. This seems particularly evident in the case of the book of Jeremiah, which, in the translation, appears in a more primitive form than in the state in which we possess it now. In a less degree does this discrepancy appear in Job, the Proverbs, Daniel, and Esther; of these, however, our canon probably contains the original form, while the LXX. shows later variants. It is, however, in neither of these books to be decided now whether the discrepancies observable are due to an already altered text upon which the translators worked, or whether they were their own emendations; or even whether many of them are not due to a much later period. The translation of the book of Daniel is the most flagrant instance of subsequently introduced 'corrections' and additions. Apart from the apocryphal pieces attached to it, its obscure passages were 'emendated' to such an extent by both Jews and Christians, that it was by the authority of the early Church utterly rejected, and rep[laced b]y the version of Theodotion. The translator of Job, though less arbitrary, has yet altered, added to, and abbreviated considerably, his text. Esther has many apocryphal additions, which owe their origin probably to the Alexandrine period, and never existed in Hebrew. Of exaggerated literalness is the version of Ecclesiastes and the Psalms. Among the most successful books are to be mentioned the Psalms and Ezekiel. But, on the whole, there is to be noticed throughout, a lack of an exact knowledge of the original, a striving after minute fidelity in one part, and an unbridled arbitrariness in another; further, a desire to tone down or to utterly eliminate anthropomorphisms or anything that appeared objectionable to the refined taste of the time.

The Septuagint was held in the very highest repute among the Alexandrine Jews, while the Palestinians looked upon it as a dangerous innovation, and even instituted the day of its completion as a day of mourning. Gradually, however, it also found its way into Palestine, and at the time of the composition of the New Testament, it seems almost to have superseded the original, considering that its quotations from the Old Testament are almost invariably given from the LXX. It was read and interpreted in the synagogues for some centuries after Christ, until the increasing knowledge of the original, fostered by the many academies and schools, and the frequent disputations with the early Christians, brought other and more faithful and literal translations, such as that of Aquila, Theodotion, &c., into use, and gradually the LXX. was altogether discarded in the synagogue. The Church, however, for a long time, and the Greek Church up to this day, considered it as of equal authority and inspiration with the Hebrew text itself; and many translations were made from it into the vernaculars of different Christian communities (the Itala, the Syriac, the Ethiopian, Egyptian, Armenian, Georgian, Slavonian, &c.). The large diffusion of the LXX. among the Hellenists and the churches, and the want of anything like a critically fixed text, together with the pious desire bodily to insert the peculiar explanation given to obscure passages by single authorities, the ignorance of the copyists, and a number of other causes, contributed not a little to render the MSS. corrupt, in some instances past mending. Nor were the endeavours of Origen (q. v.) in his *Hexapla*, or of Lucianus and Hesychius for a restoration of the proper text, of any avail. The principal MSS. that have, as far as we know, survived are the Codex Alexandrinus in the British Museum, the Codex Vaticanus in Rome, and the Sinaitic Codex (imperfect) in St Petersburg; all of which belong to the time between the 4th and 6th centuries A.D. The principal editions are the Complutensian (1514—1517), reprinted in the Antwerp and Paris Polyglot; the Aldine of Venice (1518); the Sixtine of Rome (1587), partly reprinted in Walton's Polyglot (1657) by Lamb Bos. (Franeker, 1709); Reineccius (Leip. 1730); Parsons and Holmes (Oxford, 1798—1827); Tischendorf (1850, &c.). Following more closely the Codex Alexandrinus is the edition of Grabe (Oxford, 1707 1720, completed by F. Lee), reprinted by Breitinger (Zurich, 1730—1732) and others. The Alexandrine Codex has been reproduced in facsimile by H. H. Baber; the Sinaitic in the same manner by Tischendorf. Some other MS. recensions are mentioned by the early Fathers, such as the 'Hebrew,' the 'Syrian,' the 'Samaritan,' the 'Hellenian,' &c. The literature of the LXX. is very large, and special grammars and dictionaries have been compiled for its peculiarly corrupt idiom.

SEPULCHRAL MOUND. The practice of rearing mounds of earth and stone over the resting-place of the dead may be traced to remote antiquity. It had doubtless its origin in the heap of earth displaced by interment, which, in the case of the illustrious warrior or chief, it became the practice to raise into the size and form of the barrow or tumulus which is found all over Northern Europe, from Great Britain and Ireland to Upsala in Sweden, and the Steppes of Ukraine. Sepulchral mounds of some sort seem, indeed, to have been erected among all the nations of Asia as well as of Europe, and they are found in numbers in Central America. Some of the larger tumuli or moathills are but partially artificial; natural mounds having been added to or shaped into the form which it was wished that they should take. There is considerable diversity in the form of the tumuli, the different forms corresponding to different periods, considerably remote from each other. The oldest are long-shaped, and in the form of gigantic graves, often depressed in the centre, and elevated towards one end. Inside the tumulus, the body was laid at full length, often along with spear and arrow heads of flint and bone. The bell and bowl-shaped tumuli seem to have succeeded this early form. Within them is often found a short cist and primitive cinerary urn, shewing that the body had been burned; but there appears also to be evidence that the processes of inhumation and cremation had been in use contemporaneously, or sometimes the body was placed within the cist in a sitting posture. Skeletons of dogs and

horses are occasionally found beside the ashes of the deceased. The sepulchral mounds which seem to be of latest date are broad and low, surrounded sometimes by an earthen vallum, and sometimes, particularly in Scotland and Scandinavia, by a circle of standing stones. In both the enclosed and encircled tumuli, weapons have been found belonging to the period when the metallurgic arts were practised, and in some instances Roman as well as native relics. A remarkable form of tumulus frequent in Sweden, and occasionally seen in Scotland, consists of an oblong mound larger than the primitive barrow, and terminated at both ends in a point, whence it has been called the *skibs ætlanger*, or ship-barrow. Scandinavian antiquaries have come to the conclusion that the bodies of the warriors of the deep were sometimes burned in their ships, whose form was repeated in the earthwork reared above their ashes.

The most numerous class of sepulchral mounds in Scotland are the *cairns* (q. v.) or tumuli of stone, which abound in every district of the country, and were often of much larger dimensions than the earthen tumuli. Another species of monument is the *cromlech* (q. v.).

SEPULVEDA, Juan Ginés de, a Spanish historian, surnamed the Livy of Spain, was born at Pozo-blanco, in the neighbourhood of Cordova, about 1490, studied first at Cordova and Alcala, and went to Bologna in 1515, where he obtained the acquaintance and esteem of the most celebrated savans of Italy and Spain. There he wrote the life of Cardinal Albornoz, which was published in 1521. He assisted Cardinal Cajetan at Naples in revising the Greek text of the New Testament, and in 1536 returned to Spain as chaplain and historiographer to Charles V., and preceptor to his son, afterwards Philip II. Died in 1573 or 1574. Erasmus speaks of S. in the *Ciceronianus* in terms of high encomium, and there is indeed little doubt that he was one of the most learned men and best writers of his time. His works comprise Latin translations of part of Aristotle (1531), and of the commentary of Alexander Aphrodisiensis (1527); miscellaneous dissertations, among which were treatises on Fate and Free-will, in opposition to Luther (1526), in favour of a war with the Turks (1529), in defence of Alberto Pio Cardinal Carpi (1531), on Marriage (1531), and in support of the congruency of the military profession with Christianity (1541), on Monarchy and the Duty of Kings (1571). His histories of the Reign of Charles V., of that of Philip II., and of the Conquests of the Spaniards in Mexico, all of them written in Latin, are still inedited. His other works were collected and published by the Royal Academy of History at Madrid in 1780 (4 vols. fol.), accompanied with a portrait of S., and an account of his life and writings.

SEQUESTRA'TION, the Scotch legal term for Bankruptcy (q. v.).—In English law, sequestration is the appropriate term denoting the process by which the creditor of a clergyman of the Church of England in possession of a living, sues out execution on his judgment, and obtains payment of the debt. In ordinary cases of lay debtors, the sheriff takes possession of the real estate of judgment debtors; but when the debtor is a clergyman, the bishop puts in force the law, and appoints sequestrators to take possession of the benefice, and draw the emoluments, and pay them over to the creditor, first making due provision for the proper celebration of divine worship.

SE'QUIN (Ital. *zecchino*, from *zecca*, the name of the Venetian mint), a gold coin first struck at Venice about the end of the 13th c., was about the size of a Ducat (q. v.), and was equivalent to about 9*s*. 4*d*. sterling. Coins of the same name, but varying in value, were issued by other states.

SERA'GLIO (properly, Serai) is the palace of the sultan at Constantinople. It stands in a beautiful situation on a head of land projecting into the sea, known as the Golden Horn, and is enclosed by walls 7½ miles in circuit. Within the walls are a variety of mosques, gardens, and large edifices, capable of containing 20,000 persons, though the whole number of the inhabitants scarcely ever reaches the half of this. The principal entrance (*Babi Humayun*, or Sublime Gate) is a kind of pavilion, which is constantly guarded by *capidjis*, or officers of the seraglio; and the chief of the large edifices within is the *harem* (Arab. sacred spot), which is distinctly separated from the rest of the seraglio, and consists of a group of houses and gardens, one of each being possessed by each of the sultan's wives, and of the habitations of the concubines and slaves. The harem is ruled by the *Kaja-khatun*, or inspector of the women, who is under the sultan's authority alone, and is supplied with what they require by the *kislar-aga*, or chief of the black eunuchs who form the principal or inner guard of the harem. The second and outer guard is given to the white eunuchs, under their chief the *kapu-agassy*, or *kapu-oghlan*. Other classes of household officers are the *mutes* (Turkish, *bisebin* or *dilsiz*), who, till recently, were the executors of the sultan's orders, especially those in which the utmost secrecy was required; the *bostandjis*, or gardeners; the *baltajis*, or cleavers of wood; and the *itsh-oghlans*, or attendants of the sultan. The sultan's mother always resides within the seraglio, but his sisters do not. Access may easily be had to the seraglio, with the exception of the harem, which is scrupulously guarded from even the eyes of strangers. The English have very improperly confounded the two terms 'seraglio' and 'harem.'

SERA'JO. See Bosna-Serai.

SERAMPO'RE, a neat town of British India, built in the European style, and extending a mile along the right bank of the Hooghly, 14 miles north of Calcutta. Paper is here manufactured in large quantity. S. was at one time a Danish settlement, but was transferred by purchase to the British in 1845. Pop. 13,000.

SERANG. See Ceram.

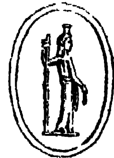
SERA'PEUM (Gr. *Serapeion* or *Sarapeion*), a temple so named in honour of Serapis (q. v.), several of which are known to have existed in the ancient world. The most remarkable of these temples was that of Alexandria, which was situated south of the canal, and outside the walls of the city, and superseded an older temple at Rhacotis. Hither was transported the statue of Dis or Pluto from Sinope by Ptolemy I., and attached to it was the celebrated Alexandrian Library (q. v.). The S. at Memphis attained scarcely less reputation, and consisted of a group of temples dedicated to Astarte, Anubis, Imouthos or Æsculapius, and Serapis. It was approached from the city of Memphis by an avenue of sphinxes, which had already become partially buried in the sands in the days of Strabo, and were discovered by M. Mariette in 1850, who, after a series of excavations, uncovered the ruins, and discovered the cemeteries of the mummied Apis or Bulls sacred to Ptah and Osiris at Memphis. Close to the S. was the Apeum, or temple of the living Apis, in which the bull lived, as well as the cow which had produced him. The S., or, as it was called in Egyptian, the abode of *Osor-hapi*, or the Osiris-

Apis, was, in fact, the sepulchre of the bull. The most remarkable part of the work, which was of great extent, was the subterranean tombs of the mummies of the Apis, consisting of galleries with numerous chambers, in which the remains of these bulls had been deposited from the reign of Amenophis III. of the 18th dynasty, about 1400 B.C., till the time of the Romans. Two principal galleries contained the tombs. The second gallery, commenced in the 53d year of Psammetichus I., was on a grander scale than the first, with larger sepulchral chambers, and magnificent sarcophagi of granite, measuring sometimes 12 feet high, 15 feet long, and weighing many tons. During the reign of the Persians, and subsequently, the chambers decreased in size, and the monuments exhibit the general decadence of the arts. The Apis, considered as the incarnation of the god Ptah during life, received royal and divine honours after death; his body, or the principal portion, being embalmed, and a sepulchral tablet or tombstone placed on his sepulchre, along with other tablets of different worshippers, who adored his divinity, and dedicated them to the deceased bull. As the principal tombstone of the bull contained the dates of the king's reign in which he was born or discovered, enthroned in the Apeum, and died or was buried in the S., these tablets have become an important element for the chronology of the 19th and subsequent dynasties, and have aided to fix some of the hitherto doubtful points of the chronology of the period. They terminate with Ptolemy Euergetes II., 177 B.C. The tablets, votive and sepulchral, amounted to about 1200, and the most remarkable are at present in the Museum of the Louvre at Paris. Numerous bronze figures and other antiquities were found during the excavations, comprising costly objects of jewellery, many of which are also in the Louvre. Besides these, several Greek papyri which appear to have formerly belonged to the library or archives of the S. were previously known, and many have been published. These throw great light upon the constitution of the hierarchy of the S., amongst which was a kind of order of monks, who lived within the precincts of the building, he ould which they did not go, and subsisted upon ms on the contributions of their family.—Mariette, *Sera . um de Memphis* (4to, Paris, 1856); *La Mère d'Apis* (4to, Paris, 1856); *Athen. Fran.* (4to, Paris, 1855–1856); Lepsius, *Ueber den Apis-kreis, Zeitsch. d. Morg. Gesell.* (8vo, Leip. 1853).

SE'RAPHIM (plural of *Seraph*), celestial beings in attendance upon Jehovah, mentioned by Isaiah. They are similar to the Cherubim (q. v.), have the human form—face, voice, two hands, and two feet—but six wings, with four of which they cover their face and feet—as a sign of reverence—while with two they fly. Nothing is more uncertain than the origin of this conception, or of the word which expresses it. Their office of singing the praises of Jehovah's greatness, and of being the swift messengers between heaven and earth, does not go far to explain it. Deserving of consideration, however, considering the close contact between Judæa and Assyria and Babylon, both before and after the Captivity, is a comparison between the S. and the winged men and beasts that have been brought to light in these last-named countries.

SE'RAPHINE, a keyed musical instrument in which the sounds were produced by the action of wind on free vibratory reeds. It was the precursor of the Harmonium (q. v.).

SERA'PIS, or SARAPIS, the Greek name of an Egyptian deity, introduced into Egypt in the time of Ptolemy I., or Soter. This monarch is said to have seen the image of a god in a dream, commanding him to remove it from the place where it was; and Sosibius, a traveller, having recognised it as existing at Sinope, Soteles and Dionysius were sent from Egypt, and brought it from Sinope to Alexandria. On its arrival, it was examined by Timotheus the interpreter and the celebrated Manetho, who called it Serapis, and appear to have identified it with Osorhapis, or Osiris united with Apis, i. e., Osiris, in his character of the Egyptian Pluto, as a deity of similar character. The figure, in fact, appears to have been one of Hades or Pluto, having at its side Cerberus, and a dragon or snake. According to some authorities, the statue of S. was sent to Ptolemy II., or Philadelphus, because that monarch had relieved the city of Sinope from famine by supplying it with corn, and the statue was placed in the Serapeum, at the promontory of Rhacotis. The S. of the Ptolemaic period, however, was not an Egyptian, but a Greek deity, whose temple was not admitted into the precincts of Egyptian cities, and only found favour in the Greek cities founded in Egypt. It is said that 42 temples were erected under the Ptolemies and Romans to this god in Egypt. His resemblance to Osiris consisted in his chthonic or infernal character, as judge of the dead and ruler of Hades. About his nature and attributes the Greeks themselves entertained very different ideas, some considering him allied to the Sun, others to Æsculapius or Hades. The god had a magnificent temple at Alexandria, to which was attached the celebrated Library; another at Memphis, in the vicinity of the cemetery of the mummies of the Apis, which has been recently excavated by M. Mariette; and another temple at Canopus. From recent discoveries, it appears that he represented or was identified with the Hesiri Api, or Osorapis, the 'Osirified' or 'dead Apis,' who was also invested with many of the attributes of Osiris, and considered, while living, to be the incarnation of the god Ptah-Socharis-Osiris, the tutelary divinity of Memphis. The worship of S., introduced into Egypt by the Ptolemies, subsequently became greatly extended in Asia Minor; and his image, in alliance with that of Isis and other deities, appears on many of the coins of the imperial days of Rome. In 146 A.D., the worship of the god was introduced into the city of Rome by Antoninus Pius, and the mysteries celebrated on the 6th May: but they were not long after abolished by the senate, on account of their licentious character. A celebrated temple of S. also existed at Puteoli (Pozzuoli), near Naples, and the remains of it are still seen, and present curious geological phenomena. In Egypt itself, the worship of the deity subsisted till the fall of paganism, the image at Alexandria continuing to be worshipped till destroyed, 398 A.D., by Theophilus, archbishop of that town. Busts of S. are found in most museums, and his head or figure engraved on certain stones was supposed to possess particular mystic virtues. His temples were oracular, the votaries consulting him by sleeping and dreaming in them; and at Alexandria the priests connected his worship with the healing art.—Plutarch, *De Isid*, s. 28; Clemens, *Orat. Adhort.* p. 21; Tacit. *Hist.* iv. c. 83, 84; Strabo, Lib. xvii. p. 552; Macrobius, *Saturn*, i. 7, 25; Nixon, *Dell' Edifizio di Pozzuoli detto il Tempio di Serapide* (Nap. 1773); Wilkinson, *Mann. and Cust.* iv. p. 360; Gibbon, *Decline and Fall*, c. 28.



Serapis.
From a Seal in the British Museum.

SERA'SKIER, or **SERI-ASKER** (Pers. head of the army), the name given by the Turks to every general having the command of a separate army, and, in particular, to the commander-in-chief or minister of war. The seraskier, in the latter sense, possesses most extensive authority, being subordinate only to the sultan and grand vizier; he is selected by the monarch from among the pashas of two or three tails.

SERENA'DE (Ital. *serenata*), originally music performed in a calm night; hence an entertainment of music given by a lover to his mistress under her window. Serenading has been chiefly practised in Spain and Italy. It is common among the students of the German universities to assemble at night under the window of a favourite professor, and give him a musical tribute.—A piece of music characterised by the soft repose which is supposed to be in harmony with the stillness of night, is called a serenade, or sometimes a *Notturno*.

SERETH, an important affluent of the Danube, rises in the Austrian crownland of Galicia, becomes for some distance the boundary between Moldavia and Walachia, and joins the Danube 5 miles above Galatz, after a course of 300 miles.

SERF (Lat. *servus*, a slave). A numerous class of the population of Europe known as serfs or villeins, were in a state of slavery during the early middle ages. In some cases, this serf population consisted of an earlier race, who had been subjugated by the conquerors; but there were also instances of persons from famine or other pressing cause selling themselves into slavery, or even surrendering themselves to churches and monasteries for the sake of the benefits to be derived from the prayers of their masters. Different as was the condition of the serf in different countries and at different periods, his position was on the whole much more favourable than that of the slave under the Roman law. He had certain acknowledged rights—and this was more particularly the case with the classes of serfs who were attached to the soil. In England, prior to the Norman Conquest, a large proportion of the population were in a servile position, either as domestic slaves or as cultivators of the land. The name of *nativus*, generally applied to the serfs, seems to indicate that they belonged to the native race, the earliest possessors of the soil. The powers of the master over his serf were very extensive, their principal limitations being, that a master who killed his serf was bound to pay a fine to the king, and that a serf deprived of his eye or tooth by his master was entitled to his liberty. The Norman Conquest made little change in the position of the serf. The lowest class of serfs were the *villeins in gross*, who were employed in menial household services, and were the personal property of their lords, who might sell them or export them to foreign countries; while the most numerous class, who were employed in agriculture, and attached to the soil, were called *villeins regardant*. These latter, though in some respects in a better position than the villeins in gross, might be severed from the land, and conveyed apart from it by their lord. They were incapable of enjoying anything like a complete right to property, inasmuch as it was held, in accordance with the principles of the Roman law, that whatever the slave acquired was his *peculium*, which belonged to his lord, who might seize it at his pleasure. By a peculiarity in the usages of Britain, the condition of a child as regards freedom or servitude followed the father, and not the mother, and therefore the bastards of female villeins might be free. In France and Germany, besides the classes of serf alluded to, there were others whose servitude was of a milder description, and who were only bound to fixed duties and payments in respect of their lands.

The abolition of serfdom in Western Europe was a very gradual process, various causes having combined to bring it about. The church both inveighed against the practice of keeping Christians in bondage, and practised manumission to a large extent. In the course of time, usage greatly modified the rights and liabilities of the serf, whose position must have been considerably altered when we find him making stipulations regarding the amount of his services, and purchasing his own redemption. The towns afforded in more than one way a means of emancipation. A serf residing a year in a borough without challenge on the part of his lord, became *ipso facto* a free man; and the result of experience shewed that the industry of the free labourer was quite as productive as that of the serf. At all events, serfdom died out in England without any special enactment; yet it was not wholly extinct in the latter half of the 16th c., for we find a commission issued in 1574 by Queen Elizabeth, to inquire into the lands and goods of all her bondsmen and bondswomen in the counties of Cornwall, Devon, Somerset, and Gloucester, in order to compound with them for their manumission, that they might enjoy all their lands and goods as freedmen. In a few rare instances, liability to servile duties and payments in respect of lands seem to have continued down to the reign of Charles I. In Scotland, as in England, serfdom disappeared by insensible degrees; but a remarkable form of it continued to survive down to the closing years of last century. Colliers and salters were bound by the law, independent of paction, on entering to a coal-work or salt-mine, to perpetual service there; and in case of sale or alienation of the ground on which the works were situated, the right to their services passed without any express grant to the purchaser. The sons of the collier and salter could follow no occupation but that of their father, and were not at liberty to seek for employment anywhere else than in the mines to which they had been attached by birth. Statutes 15 Geo. III. c. 28 and 39 Geo. III. c. 56, restored these classes of workmen to the rights of freemen and citizens, and abolished the last remnant of slavery in the British Islands.

In France, though a general edict of Louis X., in 1315, purported to enfranchise the serfs on the royal domain on payment of a composition, this measure seems never to have been carried into effect, and a limited sort of villeinage continued to exist in some places down to the Revolution. In some estates in Champagne and Nivernais, the villeins, known as *gens de main morte*, were not allowed to leave their habitations, and might have been followed by their lords into any part of France for the *taille* or villein-tax. In Italy, one great cause of the decline of villeinage was the necessity under which the cities and petty states found themselves to employ the peasant population for their defence, whom it became expedient to reward with enfranchisement. In the 11th and 12th centuries, the number of serfs began to decrease, and villeinage seems no longer to have had an existence in Italy in the 15th century. Over a large portion of Germany, the mass of the peasants had acquired their freedom before the end of the 13th c., but in some parts of the Prussian dominions a modified villeinage continued to exist until swept away by the reforms of Von Stein in the present century.

In Russia, where the feudal system never prevailed, the early condition of the peasant was not a servile one. Down to the 11th c., he could occupy any portion of the soil that he had the means of cultivating, the land being the property of all, and

farmed on the purest communistic principles. The reduction of the peasantry to a state of serfdom, and their attachment to the soil, was gradually effected, and not completed till the close of the 16th century. The Russian peasant of the 19th c. was in some respects in as servile a condition as the feudal villein of the 12th c. in the west of Europe; but there was this peculiarity attaching to his position, that while he himself was the property of his lord, the land which he cultivated belonged to himself—a consideration which greatly complicated the question of his emancipation. The Emperor Alexander I. introduced various improvements in the condition of the peasantry, particularly those belonging to the crown, and in his reign serfdom was abolished in Courland and Livonia. The entire abolition of villeinage has been effected by the present emperor, Alexander II., by a very sweeping measure. From March 1863, the peasants, both husbandmen and domestics, have been made entirely free as regards their persons, while they have also obtained the perpetual usufruct of their cottages and gardens, and certain portions of land.—See, on the subject of serfdom generally, Hallam's *State of Europe during the Middle Ages*, chap. 2.

SERGE, a kind of twilled worsted cloth of inferior quality. There is also a coarse kind of twilled silk used for lining gentlemen's coats called silk serge.

SE'RGEANTS (Fr. from Lat. *serviens*, serving), are non-commissioned officers of the army and marines in the grade next above corporal. They are selected from the steadiest among the corporals, and their duties are to overlook the soldiers in barracks, and to assist the officers in all ways in the field. They also command small bodies of men as guards, escorts, &c. Every company has four sergeants, of whom the senior is the colour-sergeant. A superior class are the staff-sergeants, as the quarter-master-sergeant, armourer-sergeant, hospital-sergeant; and above them all is the sergeant-major. The daily pay of a sergeant varies from 2*s*. in the Infantry to 3*s*. in the horse-artillery. For his privileges, see the article NON-COMMISSIONED OFFICERS. In ancient times, the rank of sergeant was considerably more exalted. In the 12th c., the sergeants were gentlemen of less than knightly rank, serving on horseback. Later, the sergeants-at-arms were the royal body-guard of gentlemen armed *cap-à-pie*.

SE'RGEANTY, GRAND (Fr. *sergenterie*, from Lat. *serviens*), a tenure by which lands were held in feudal times in England. After the Conquest, the forfeited lands were parcelled out by William to his adherents on condition of the performance of services of a military character. The military tenants of the crown were, however, of two descriptions: some held merely *per servicium militare*, by knight-service; others held *per sergentiam*, by grand sergeanty, a higher tenure, which involved attendance on the king not merely in war, but in his court at the three festivals of the year, and at other times when summoned. Although the word baron, in its more extended sense, was applied to both classes of crown tenants, yet it was only those holding by grand sergeanty whose tenure was said to be *per baroniam*. In its earliest stage, the distinction between the greater nobility and lesser nobility or gentry in England was, that the former held by grand sergeanty, and the latter by knight-service only. In theory, lands held by sergeanty could not be alienated or divided; but practically this came to be often done, and by this means tenures by sergeanty became gradually extinct before the abolition of military holdings. Considerable misapprehension on the part of Dugdale and later writers has arisen from a double use of the word *serviens*, or sergeant, which is sometimes applied to a tenant either by grand sergeanty or knight-service who had not taken on himself the obligations attendant on knighthood.

The term petty sergeanty was applied to a species of socage tenure in which the services stipulated for bore some relation to war, but were not required to be executed personally by the tenant, or to be performed to the person of the king, as the payment of rent in spurs or arrows.

SERGI'PÉ, a maritime province of Brazil, bounded on the N. by the Sao Francisco, which separates it from Alagoas; on the W. and S. by Bahia; and on the E. by the Atlantic. According to the most recent statements, this province is the smallest in the empire. Area, 11,088 sq. m.; pop. 183,600. The shores are low and sandy, the interior mountainous. The east part is fertile, well wooded, and produces sugar and tobacco; the western districts are devoted principally to the rearing of cattle. The chief town is Sergipe d'el Rey, at the mouth of the chief river—the Vasa Barris—and with a pop. stated at 9000.

SERINAGU'R, SIRINUGGUR, or **CASHMERE**, the capital of the valley of Cashmere, stands on both sides of the Jhelum, which is here 100 yards wide, 170 miles north-north-east of Lahore. It is quaint and picturesque-looking almost beyond conception. The streets, or rather narrow lanes, lead to the river, and the houses, five and six stories high, are built of wood. Not a single straight line is to be seen. The houses overhang the river, and lean towards each other above the lanes in various stages of dilapidation. Communication between the two quarters is kept up by means of a number of rustic wooden bridges, built on enormous piles of timber. Shawls are an important article of manufacture (see CASHMERE). The manufacture of articles of papier-maché, the designs of which are far in advance of the workmanship, and engraving on stone and metal, are also important branches of industry. The vicinity of the city, with its border of towering mountains, is exceedingly beautiful. The numerous lakes, connected with the town and river by canals, recall Venice to the traveller. The most notable public structures are the Jumna Musjid or 'Great Mosque,' capable, according to native estimate, of containing 60,000 persons, the mosque of Shah Hamedan, a royal tomb, and the governor's residence. Near the east end of the city lies the dal or Lake of Serinagur, about 5 miles long, and 2½ broad. It is a lovely and tranquil sheet of water, was formerly a choice retreat of the Mogul emperors, the remains of whose pleasure-grounds and palaces are still visible on its margin, the most celebrated being the Shalimar, of polished black marble. Pop. estimated at 40,000; in the early part of the present century, it is stated to have been from 150,000 to 200,000.—*Captain Knight's Diary of a Pedestrian in Cashmere and Tibet* (1863).

SERINGAPATA'M (properly, *Shri Ranga Patanam*, City of Vishnu), a decayed city of Southern India, built on an island in the channel of the Kaveri, nine miles north-north-east of Maisur. The island, three miles long, and one mile broad, has a wretched appearance, and the town itself is ill-built, ill-ventilated, and ugly. The fort, about three-quarters of a mile broad, is surrounded by strong walls of stone, and contains the palace of Tipu Sahib (q. v.). In the days of its highest prosperity, S. is said to have contained 300,000 inhabitants; in 1800, it contained 31,895, and now it contains little over 12,000. Hyder Ali (q. v.) made it the seat of his government in 1765. It was besieged by Lord

Cornwallis in 1791, and again in 1792. On the last occasion, the terms dictated by the commander of the British to Tipu, the son and successor of Hyder Ali, were very severe. A British army appeared before the walls again in 1799; and on the 3d May of that year, the fort was stormed, and Tipu slain in the vicinity of his own palace.

SERJEANT-AT-ARMS, in the English Court of Chancery, is the officer who attends upon the Lord Chancellor with the mace, and who executes by himself or deputies various writs of process directed to him in the course of a Chancery suit, such as apprehending parties who are pronounced to be in contempt of the court. A similar officer attends on each House of Parliament, and arrests any person ordered by the House to be arrested.

SERJEANT-AT-LAW used to be the highest degree of barrister in the common law of England, and was called serjeant-counter, or of the coif. The degree is of great antiquity, and formerly a barrister could only be appointed after being of sixteen years' standing, but now no particular qualification as to time is required. Formerly, also, they had exclusive audience in the Court of Common Pleas, but that monopoly has been abolished. The proper forensic dress of a sergeant is a violet-coloured robe with a scarlet hood. A serjeant is appointed by a writ or patent of the crown. The Chief Justice of the Common Pleas recommends the barrister to the Lord Chancellor, who advises the crown to make the appointment. The degree of serjeant is entirely honorary, and merely gives precedence over barristers; and when he is appointed, he is rung out of the Inn of Court to which he belongs, and thereafter joins the brotherhood of Serjeants, who form a separate community. By ancient custom, the common law judges are always admitted to the order of serjeants before sitting as judges, and hence they always address a sergeant as a brother. A Queen's Counsel (q. v.) takes precedence of all serjeants, unless these have patents of precedence, which prevent them being displaced by the Queen's Counsel who come after them. Sometimes one or more of the serjeants are appointed Queen's Serjeants.

SEROUS FLUIDS. This term is applied by chemists and physicians to various fluids occurring in the animal body. They are arranged by Gorup-Besanez, one of the highest authorities on Physiological Chemistry, under three heads: 1. Those which are contained in the serous sacs of the body, as the cerebro-spinal fluid, the pericardial fluid, the peritoneal fluid, the pleural fluid, the fluid of the tunica vaginalis testis, and the synovial fluid. 2. The tears and the fluids existing in the eyeball, the amniotic fluid, and transudations into the tissue of organs. 3. Morbid or excessive transudations, such as dropsical fluids, the fluids occurring in hydatids, and in blebs and vesicles on the skin, and transudations from the blood in the intestinal capillaries, as in cases of intestinal catarrh, cholera, or dysentery.

All these fluids bear a close resemblance to one another, both in their physical and chemical characters. In so far as relates to their physical characters, they are usually clear and transparent, colourless or slightly yellow, of a slight saline, mawkish taste, and exhibiting an alkaline reaction with test-paper. They possess no special formal or histological elements, but on a microscopic examination, blood-corpuscles, cells of various kinds, molecular granules, and epithelium may occasionally be observed in them. The ordinary chemical constituents of these fluids are water, fibrin (occasionally), albumen, the fats, animal soaps, cholesterin, extractive matters, urea (occasionally), the same inorganic salts which are found in the serum of the blood, and the same gases as occur in the blood. As rare constituents, and only occurring in disease, may be mentioned sugar, the biliary acids, salts of lactic and succinic acids, creatinine, mucin, &c. The following analyses of four of these fluids will serve to give a good idea of their composition:

	Plasma of the Blood.	Peritoneal Dropsy.	Hydrothorax.	Dysenteric Transudation.
Water,	901·51	946·0	936·0	958·6
Solid Constituents,	98·49	54·0	64·0	41·4
Fibrin,	8·06		0·6	
Albumen, } Extractive Matters, }	81·92	33·0	52·8	15·0
		13·0	3·0	14·6
Inorganic Salts,	8·51	8·0	7·4	11·8

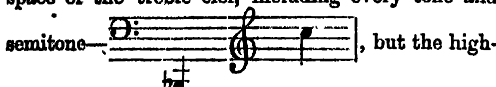
SEROUS MEMBRANES. There are seven of these membranes in the human body, three being median and single, while two are double and lateral. They are the arachnoid, the pericardium, and the peritoneum, with the two pleuræ and tunicæ vaginales testis. Thus they are connected, with the obvious view of facilitating motion and affording general protection, with all the most important organs in the body. They are all closed sacs, with one exception, and a reference to the articles PERICARDIUM, PERITONEUM, and PLEURÆ, will at once shew the reader that each sac or continuous membrane consists of two portions—a parietal one, which lines the walls of the cavity, and a visceral, or reflected one, which forms an almost complete coating or investment for the viscera contained in the cavity. The interior of the sac is filled during life with a halitus or vapour, which after death condenses into a serous fluid. With regard to their structure, it is sufficient to state that they consist essentially of (1) Epithelium; (2) Basement Membrane; (3) A stratum of areolar or cellular tissue, which constitutes the chief thickness of the membrane, and is the constituent on which its physical properties are mainly dependent. This layer is more liable to variation than the others, and one of the most common alterations is an augmentation of the yellow fibrous element, by which an increased elasticity is given to the membrane, which is thus better adapted for distention, and for a subsequent return to its original bulk. The situations in which this augmentation is found are, as Dr Brinton (*Cyclopædia of Anatomy and Physiology*, vol. iv. p. 524) has pointed out, in exact conformity with this view: in the peritoneum, which lines the anterior abdominal wall, and covers the bladder, it attains its maximum; in the detached folds of the mesentery, in the costal pleuræ, and in the suspensory ligament of the liver, it is still very prominent; while on the posterior wall of the belly, and in serous membranes covering the heart, liver, &c., it is almost absent.

The following are the most important of the morbid changes to which these membranes are liable. One of the most frequent of the morbid appearances seen in these structures is the presence of an excess of serous fluid in their cavity. This condition occurs in deaths from various diseases, and in general the serous membrane only shares in a dropsy which is common to other structures, and especially affects the areolar or cellular tissue. When general anasarca, or dropsy of the cellular tissue, has existed for a long time, more or less dropsical effusion is usually found in the pleuræ and peritoneum. The inflammation of these structures is sufficiently described in the articles PERICARDITIS, PERITONITIS, and PLEURISY. Tubercle is seldom primarily deposited in these membranes, although it is not uncommon after other organs have been implicated. Cancer and ossification of the serous membranes are rare affections, but cysts

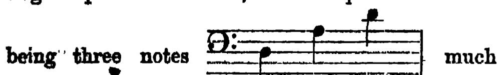
of various kinds, some of which are of parasitic origin, are often found.

Synovial membranes present many points of similarity to serous membranes; as, however, they also present several points of difference, they will be briefly noticed in a special article.

SERPENT, a powerful bass musical wind instrument, consisting of a tube of wood covered with leather, furnished with a mouthpiece like a trombone, ventages, and keys, and twisted into a serpentine form, whence its name. Its compass is said to be from B♭ below the bass staff to C in the third space of the treble clef, including every tone and semitone—



, but the highest octave does not sound well with ordinary players. When unskilfully played, it exhibits the most startling inequalities of tone, in consequence of there being three notes



much more powerful than the rest. The serpent is in B♭, and therefore music for it must be written a whole tone above the real sounds. The serpent was invented by a French priest at Auxerre in 1590, and while its principal use has been in military music, it has also been employed in the orchestra to reinforce the basses. As an orchestral, and even as a military instrument, the serpent is far less manageable than the Ophicleide (q. v.), which has nearly superseded it. It is still much used in the music of the Roman Catholic Church.

SERPENTA'RIA. See ARISTOLOCHIA.

SERPENT-CHARMING, an art which has been practised in Egypt and throughout the East from remote antiquity, and which forms the profession of persons who employ it for their own gain, and for the amusement of others. In India, and partly if not entirely in other countries, this profession is hereditary.

There are several allusions to serpent-charming in the Old Testament: see Psalm lviii. 4, 5; Eccles. x. 11; Jer. viii. 17. It is mentioned also by some of the ancient classics, as Pliny and Lucan.

Serpent-charmers usually ascribe their power over serpents to some constitutional peculiarity, and represent themselves as perfectly safe from injury even if bitten by them. To confirm this, they are accustomed, in their exhibitions, to exasperate the serpents, and allow themselves to be bitten, so that blood flows freely. But it has been fully ascertained that the serpents which they carry with them, and produce on these occasions, although of the most venomous kinds, have been at least deprived of their poison-fangs, and to prevent new ones from growing, a portion of the maxillary bone is often if not always taken out; in some cases, it appears that the poison-glands themselves are removed by excision and cautery.

So much, however, being set aside as of the nature of a mere juggler's trick, much still remains which is interesting, and in which there is unquestionable reality. The serpent-charmers of the East have a power beyond other men of knowing when a serpent is concealed anywhere, long practice having probably enabled them to distinguish the musky smell which serpents very generally emit, even when it is too faint to attract the attention of others. They are therefore sometimes employed to remove serpents from gardens and the vicinity of houses. In this, as in their exhibitions, they pretend to use spells. What power the tones of their voice may exert, is of course uncertain; but they accompany their words with whistling, and make use also of various musical instruments, the sound of which certainly has great power over serpents. When they issue from their holes, the serpent-charmer fearlessly catches them, by pinning them to the ground by means of a forked stick. But one of the first things he does afterwards is to knock out or extract the poison-fangs.

In the exhibitions of serpent-charmers, the creatures are often made to twine round the bodies of the performers. They also erect themselves partially from the ground, and in this posture they perform strange movements to the sound of a pipe, on which the serpent-charmer plays. It appears also that he exerts a very remarkable influence over them by his eye, for even before any musical sound has been employed, he governs and commands them by merely fixing his gaze upon them.

In 1850, a party of Arab serpent-charmers visited London, where exhibitions took place similar to those which are common in the East.

SE'RPENTINE, a mineral, composed of silica and magnesia in almost equal proportions, with about 13—15 per cent. of water, and a little protoxide of iron. S. is generally massive; very rarely crystallised in rectangular prisms. COMMON S. sometimes occurs as a rock. It is unctuous to the touch, and soft enough to be scratched by calcareous spar. It is not easily broken, but can be cut without much difficulty. It is generally green, black, or red; the colour sometimes uniform, sometimes spotted, clouded, or veined. It receives its name from the serpent-like form which the veins often assume. It is cut and turned into ornaments of various kinds. PRECIOUS S., or NOBLE S., is of a rich dark-green colour, hard enough to receive a good polish, translucent; and sometimes contains embedded garnets, which form red spots, and much add to its beauty. It is a rare mineral. It occurs at Baireuth in Germany, in Corsica, at Portsoy in Banffshire, in the Shetland Islands, &c. It is generally found along with foliated limestone, in beds under gneiss, mica-slate, &c., or in Common Serpentine. The ancient Romans used it for pillars and for many ornamental purposes; and vases, boxes, &c. are still made of it, and much prized. The ancients ascribed to it imaginary medicinal virtues.

S. belongs to the metamorphic rocks. It occurs as an irregularly overlying mass in the Lizard district of Cornwall, as a dyke at Portsoy, and as nodular aggregations in the granite of Aberdeenshire. It is generally associated with the granitoid, igneous, or metamorphic rocks, though it is occasionally found as a member of the trappean series. Trap dykes, in passing through or coming into contact with limestone, not unfrequently convert it into serpentine, or fill it with lines or masses of serpentine.

SERPENTS (*Ophidia*), an order of Reptiles, which is in general simply characterised as having a very elongated body and no external limbs. The links, however, which unite saurians with serpents are very numerous; the limbs of many saurians being partially wanting, and little more than rudimentary; whilst rudimentary limbs are found by anatomical examination in many serpents, and the rudimentary hinder limbs of some, as boas, appear externally in the form of hooks or claws. See BOA.

The body and tail are covered with scales, the head often with plates. The vertebræ and ribs are extremely numerous, a pair of ribs being attached to each vertebra throughout the whole length of the body. Some serpents have more than 300 pair of ribs. The ribs not only serve to give form to the body, and aid in respiration, but are also organs

of locomotion. There is no breastbone (*sternum*) for the small end of the ribs to be attached to, as in other vertebrate animals, but each rib is joined by a slender cartilage and a set of short muscles to one of the scales of the abdomen. A serpent moves

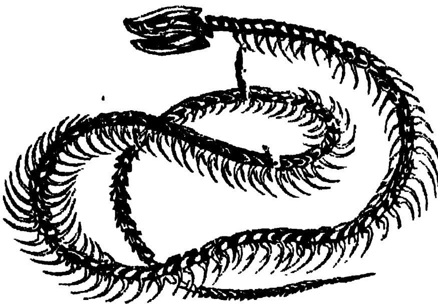


Fig. 1.—Skeleton of the Rattlesnake.

by means of the ribs and of these scales, which take hold on the surface over which it passes, and in this way it can glide—often very rapidly—along the ground, or on the branches of trees; and many species climb trees with great facility, gliding up them as if on level ground. Most—if not all—of the species are also capable of elevating a great portion of the body from the ground; and many of those which live among the branches of trees hold their place firmly by means even of a few scales near the tail, and freely extend the greater portion of the body in the air. On a perfectly smooth surface, as that of glass, a serpent is quite helpless, and has no power of locomotion.

The vertebræ of serpents are so formed as to admit of great pliancy of the body, which is capable of being coiled up, with the head in the centre of the coil, and some serpents have the power of throwing themselves to some distance from this coiled position. The vertebræ are articulated by perfect ball-and-socket joints, the anterior extremity of each being rounded into a smooth and polished ball, which fits exactly into a hemispherical cup in the next; but there are processes in each vertebra which prevent any motion except from side to side, so that serpents are quite incapable of the vertical undulations so often represented in prints. The ribs are also attached to the vertebræ by ball-and-socket joints.

Cuvier divided serpents into three sections, the first—of which the common Blindworm (q. v.) or Slow-worm of Britain is an example—consisting of those which have the skull, teeth, and tongue similar to those of saurians, and in which the eye has three lids, and there are vestiges of bones of anterior limbs; the second, which Cuvier calls True Serpents, having no vestiges of such bones, the eye destitute of lids, and the bones of the head so formed that the mouth and throat are capable of very great dilation; the third, which he calls Naked Serpents, containing only the genus *Cæcilia* (q. v.), now known, notwithstanding its form, to belong really to the Batrachians or Amphibia.

The serpents of Cuvier's first section have been conjoined with some of the nearly allied saurians, more or less furnished with external limbs, under the name *Saurophidia*, by Mr Gray. They are connected with the True Serpents by the families *Amphisbænidæ* and *Typhlopsidæ*, which nearly agree with them in the structure of the head and mouth, but want the third eyelid—some of the *Typhlopsidæ*, indeed, having the eye itself merely rudimentary—and, like the True Serpents, have no vestige of breast-bone or shoulder. These, with all the creatures included in this section, are, in so far as is known, perfectly harmless. They live chiefly on insects and other very small animals.

The True Serpents live on larger prey, which they swallow entire, some of them—as the boas—crushing it by constriction in the coil of their muscular body. The prey of a serpent is often thicker than the serpent itself, and to admit of its being swallowed, the throat and body are very dilatable. The bones of the head are adapted to the necessity of a great expansion of the mouth and dilation of the throat, as will be seen by the annexed figure of the distended jaws of the rattlesnake. The bones composing the upper jaw are loosely joined together by ligaments; and even the arches of the palate are movable. The two halves of the lower jaw are connected by a ligament, so loose and elastic that they are capable of separation to a great extent; and the mastoid and tympanic bones, which connect the lower jaw and the skull, are lengthened out into pedicles, allowing an extraordinary power of dilation. Serpents, however, sometimes seize prey too big for them to swallow, and die in the attempt, their teeth being so formed as to prevent them from rejecting by the mouth what has once got into the throat.

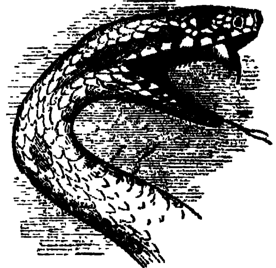


Fig. 2.

The teeth of the True Serpents are simple, and directed backwards. In the non-venomous kinds, there are four rows on the upper part of the mouth, two rows on the jaws, and two on the palate; each division of the lower jaw is also armed with a single row. In vipers, rattlesnakes, and other venomous serpents, there are no teeth on the upper jaw, except the poison-fangs; the palatal teeth, however, forming two rows as in the non-venomous kinds, the arrangement of teeth in the lower jaw being also the same. Venomous serpents do not, in fact, need the same array of teeth as the non-venomous; depending rather on the power of their venom for their prey, which they suddenly wound, and then wait till it is dead. The poison-fangs are long in comparison with the other teeth; they are two in number, firmly fixed into a movable bone; when not in use, they are laid flat on the roof of the mouth, covered by a kind of sheath formed by the mucous membrane of the palate; when the animal is irritated, and about to assail its enemy or its prey, they stand out like two lancets from the upper jaw. They move with the bone into which they are fixed; and the bone and muscles are so arranged that the opening of the mouth brings them into the position for use. There is above them, and towards the back of the head, a large gland for the elaboration of the poison, which is forced through them by the action of the muscles; each fang being tubular. The tube of the fang is formed, not as by a hollowing of it, but as by a bending of it upon itself, and is situated in front. The opening at the point of the fang is a narrow longitudinal fissure. The poison-fangs are very liable to be destroyed, and the germs of new ones are generally found behind them, ready to grow and supply their place.

It is sometimes stated as a distinction between venomous and non-venomous serpents, that the

former have only two rows of teeth on the upper part of the mouth, whilst the latter have four. This rule must not, however, be accepted without qualification. In the marine serpents (*Hydridæ*), there are rows of maxillary teeth behind the poison-fangs; and some of the venomous land-serpents, as the Bongars or Rock Snakes of the East Indies, which, however, are not amongst the most venomous, have some smaller teeth in the jaw-bones behind the poison-fangs.

The venom of serpents differs very much in its deadly power in different species. The bite of some causes the death of a human being in a few minutes, so that no creatures are more formidable; that of others proves fatal after the lapse of hours; whilst the bite of others, such as the common viper, is seldom fatal, although causing great pain and many unpleasant consequences. 'I have carefully examined all the evidence on record,' says Mr Buckland, 'as regards the most efficacious internal remedy that can be given in such cases, and have come to the conclusion that nothing is so good as ammonia' (*Curiosities of Natural History*). The same writer also recommends brandy or other stimulating drinks to be taken in large quantities. But it is of the utmost importance to suck the wound as soon as possible after it has been inflicted, and no danger is to be apprehended in doing so, if there be no scratch or sore about the mouth, for the poison, so deadly when it mixes with the blood, is quite innocuous when taken into the stomach.

Many antidotes to the poison of serpents are in vogue in different countries, most of them, if not all, utterly unworthy of regard. But a method employed in India, by those who collect cobras for the exhibition of serpent-charming, seems to deserve notice: it is the prompt application to the wound of certain balls, which probably act by absorbing the poisoned blood, and extracting it from the wound. What these balls are made of, is not yet well known, though they are said to have the appearance of bone that has passed through great heat. Their absorbent power is certainly great.

The peculiarities of the lungs of serpents are noticed in the article REPTILES. The heart is placed very far back in the body. The intestines have a great absorbent power, and the fæces consist only of the most indigestible portions of the prey in an extremely desiccated state; the members of the animal which has been swallowed being still often distinguishable, and hair, scales, and the like remaining unchanged.

The tongue of serpents is forked, and is often thrust out of the mouth. It is vulgarly regarded as the *sting*, but serpents have no sting, their only weapons being the fangs already noticed. The only sound which serpents emit is that of hissing.

Serpents are either strictly oviparous or they are ovoviviparous. The non-venomous serpents are generally oviparous; the venomous, ovoviviparous. The eggs of those which lay eggs are generally deposited in a long string, connected by a kind of viscous substance, in some heap of decaying vegetable matter, the mother paying no further heed to them. But some serpents coil themselves around their eggs and hatch them; and it would even seem that the habits of the same species differ as to this, in different climates. The eggs of serpents are not quite devoid of calcareous covering, but have so little that their integument is soft and pliable.

It has been often alleged that vipers and other serpents, when alarmed, swallow their young, and eject them again after reaching a place of safety. There still remains some doubt on this curious question, which has recently been much discussed; and it is not improbable that the alleged proofs of it from living young ones issuing out of the body of the parent when crushed, are to be accounted for by the ovoviviparous mode of generation.

It seems probable that serpents do not possess the senses of taste or smell in great perfection. The ear has no external opening, and no tympanum, nor is it certain that their hearing is acute, but they are remarkably sensible of the power of music, of which serpent-charmers avail themselves, both to bring them from their holes and to control them. See SERPENT-CHARMING. A European gentleman, residing in one of the mountainous parts of India, found that his flute attracted them in such numbers to his house that he was under the necessity of ceasing to play it. Their eyes are small, and are protected from the dangers to which they might otherwise be exposed, by a transparent integument connected with the skin, and which comes away with the skin when the old skin is cast off, as is the case at least once a year.

The colours of serpents are very various, and often very beautiful. As a general rule, but not without exceptions, the venomous species are of darker and more uniform colour than the non-venomous. The aversion and horror with which serpents are so generally regarded, are of course due to the dangerous character of so many of them, and the difficulty of observing and avoiding them.

Serpents are used as food by some savage tribes. They are capable of being tamed, and some of the non-venomous species have frequently been so, and have been found useful in killing mice, rats, and other such vermin.

Serpents abound chiefly in tropical climates, although some are found in northern countries, as in Scandinavia. The British species were, until recently, supposed to be only three in number—the Blindworm (one of the *Saurophidia*), and two True Serpents, the Common Snake and the Viper, the

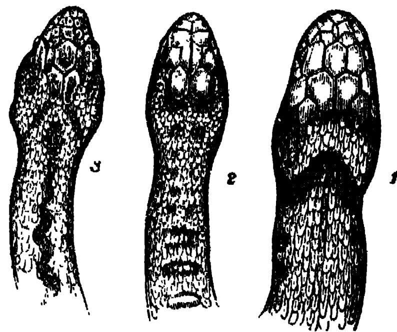
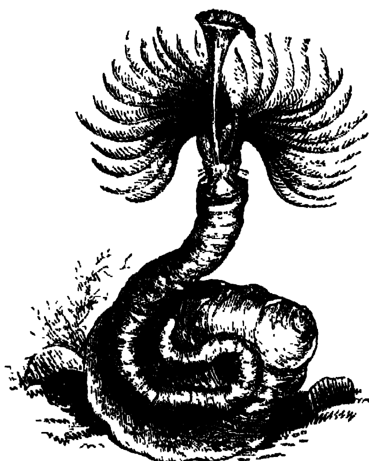


Fig. 3.
1, Common Snake; 2, Coronella lævis; 3, Viper.

last alone being venomous. Recently, however, much interest has been excited by the discovery in England of the *Coronella lævis* (see CORONELLA), a harmless snake, common in some parts of the continent of Europe. Its discovery is more recent than the publication of the article CORONELLA in this work. The distinctive features of three of the snakes here mentioned will be at once seen in the accompanying illustration, for which we are indebted to the *Field* newspaper.

SERPUKO'V, a very ancient Russian town, 56 miles south of Moscow, close to the left bank of the Oka. It contains a cathedral, and is defended by a Kreml, or citadel. There are upwards of 50 factories, of which those engaged in the manufacture of sailcloth, woollen goods, and leather are of importance. Pop. about 15,000.

SE'RPULA, a genus of Annelida, of the order *Tubicolæ*, forming and inhabiting a calcareous tube, like that of molluscs, and therefore described in old works on conchology. Indeed, the shell of a S. is not always easily distinguished from that of molluscs of the genus *Vermetus*, although the inhabitants are extremely different; but the shell of *Vermetus* has a regular spire at the apex, which is not found in that of any serpula. The serpulæ attach their shells to rocks, shells, &c. in the sea. The shell is variously contorted, and some of the species live in groups, with the shells intertwined. The wider end of the shell is open, and from it the animal protrudes its head and gills, which expand as beautiful fan-like tufts. They are in general exquisitely coloured, and serpulæ are among the most interesting and beautiful creatures that can be placed in an aquarium. On the slightest alarm, they disappear completely into the tube, which then is closed by an operculum curiously framed as an appendage to the gills. Several species of S. are common on the British coasts, but the largest are found in tropical seas, and are among the many lovely objects to be seen in looking down through clear still water on coral reefs.



Serpula Contortuplicata.

SERRAVA'LLÉ, a city of Northern Italy, in Venetia, on the river Aleschio, 35 miles north of Venice. It is situated in a valley, and was formerly fortified. The cathedral S. Andrea is very ancient. Pop. 5714.

SERTO'RIUS, Q., one of the ablest Roman commanders in the later ages of the Republic, was a native of Nursia, in the country of the Sabines, and began his military career in Gaul. He fought, 105 B.C., in the disastrous battle on the Rhone in which the Roman proconsul, Q. Servilius Cæpio, was defeated by the Cimbri and Teutones, and took part in the splendid victory at Aquæ Sextiæ (mod. Aix), 102 B.C., where Marius annihilated the same barbarians. On the breaking out of the sanguinary struggle between the party of the nobles under Sulla (q. v.) and the popular party headed by Marius (q. v.) (88 B.C.), he espoused the cause of the latter. Morally, he was much superior to the military adventurers of his time; and the impression we have of him from Plutarch's picturesque biography is that of a valiant, resolute, honest, and stubborn Roman, such as was commoner in the 3d than in the 5th c. of the Republic. None of the Marian generals held out so long or so successfully as he against the victorious oligarchy. He fought in conjunction with Cinna the battle at the Colline Gate, which placed Rome at the mercy of the Marians, but he had no hand in the bloody massacres that followed. What we do hear of him is to his credit. He got his own troops together, and slew 4000 of the ruffianly slaves whom Marius was permitting to plunder and ravish at will through the city. On the return of Sulla from the East (83 B.C.), S. withdrew into Etruria, but finding it impossible to act in concert with the other military leaders of his party, he went to Spain, where he continued the struggle in an independent fashion. At first he was not very successful, and found it advisable to embark for Mauritania. After several adventures, in the course of which he once passed through the Strait of Gibraltar, and fell in with some sailors who had visited the Atlantic islands, and whose descriptions so wrought upon his imagination, that he 'was seized with a strong desire to dwell in the islands, and to live in quiet, free from tyranny and never-ending wars'—(Plutarch)—he returned to the Peninsula, at the invitation of the Lusitanians, got together an army composed of natives, Libyans and Romans, and after a time became the virtual monarch of the whole country. During 80—76 B.C., he was victorious over all his opponents, nor was it until the arrival (76 B.C.), of young Pompey ('Pompey the Great'), that he found an opponent worthy to cope with him; and even Pompey was scarcely yet his equal in military skill. S. drove Pompey over the Iberus (Ebro) with heavy loss; nor was the campaign of the following year (75 B.C.), more favourable, for though S.'s subordinates were twice beaten, Pompey himself had no success, and was forced to write urgent letters to the senate for reinforcements. The campaigns of the next two years were unimportant, except in so far as they shew us the gradual operation of that miserable jealousy and envy of S. that brought about his ruin. Perperna, and other Roman officers of the Marian party, who had fled to him in 77 B.C., when Sulla became triumphant at home, and who seem to have been a set of base adventurers, secretly stirred up the Spaniards against him, and when that artifice did not prove so successful as was hoped, they conspired against his life, and assassinated him in his own tent, 72 B.C., under circumstances of shameful perfidy. With S. the Marian or popular cause sunk, until it was revived and attained final success in the person of Julius Cæsar (q. v.). Plutarch has written S.'s life, and Corneille has made it the subject of a tragedy.

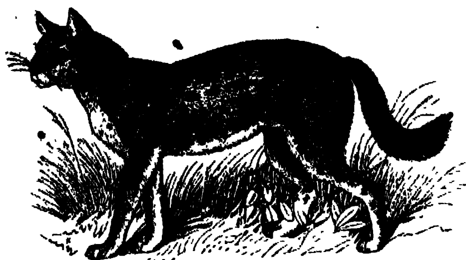
SERTULA'RIA, a genus of zoophytes (*Anthozoa*), plant-like and branched, horny, tubular, filled with a semi-fluid organic pulp, the polype cells in two rows on the branches, the polypes hydra-like. The species are numerous, and some are common on the British coasts, attached to stones, shells, sea-weeds, &c. The sertulariæ are very beautiful.



Sertularia Ingra, with a portion magnified.

SE'RUM. See BLOOD.

SE'RVAL (*Felis Serval* or *Leopardus Serval*), one of the smaller *Felidæ*, a native of South Africa, the *Boschkatte*, or Bush-cat, of the Cape Colony. It is about two feet in length, exclusive of the tail. The S. is a beautiful animal, yellowish with black



Serval (*Felis Serval*).

spots, the lower parts white with black spots. The fur of the S. is in great request, and is known to furriers as that of the *Tiger Cat*. The S. is one of the mildest and most docile of the *Felidæ*.

SERVANT. See MASTER AND SERVANT.

SERVETUS, MICHAEL, or, in his native Spanish, MIGUEL SERVEDE, a notable and unfortunate speculator in theology, was born at Villanueva, in Aragon, in 1509. At the age of nineteen, he quitted Spain, and commenced the study of law at Toulouse, which he soon abandoned to devote himself with ardour to the knotty points of the Reformation doctrines. In 1530, he went to Basel to hear Œcolampadius, and thence to Strasburg, where Bucer and Capito taught. His daring denial of the doctrine of the Trinity frightened or angered these divines to such a degree that they denounced him as 'a wicked and cursed Spaniard.' S. appealed from their judgment to that of the public in his *De Trinitatis Erroribus Lib. VII.* (Haguenau, 1531; modern edition, Nürnberg, 1791), and his *Dialogues* (Haguenau, 1532); but the public thought as little of his teaching as the theologians; and to avoid the odium which it had occasioned, he changed his name to Michael de Villanueva, and fled to Paris, where he studied medicine under Sylvius and Fernel, and took his degree as a physician with honours. S. seems to have possessed a kind of penetrating, if also rash and restless intellect, which enabled him to *hit* truth occasionally in his flighty researches, or, at least, to make happy guesses in the right direction. Thus, for example, he had an idea (see M. Flourens in the *Journal des Savants*, April 1854) of the doctrine of the circulation of the blood. He attacked Galen and the Faculty with his customary violence in a treatise on Syrups (*Syruporum Universa Ratio*, Paris, 1537; Lyon, 1546). About this time, he made the acquaintance of Calvin, with whom he had several conferences or private disputations, the result of which was a public challenge; but S., after assenting to the arrangements, decamped, afraid probably, and not without reason, that his precipitate imperious way of thinking did not fit him for discussing with so cool, wary, and merciless a logician as the Genevese reformer; afraid, too, perhaps, of being unceremoniously handed over to the authorities for heresy! After living successively for some time at Lyon, Charlieu, and Avignon, and supporting himself by writing for the booksellers, he found an asylum in the palace of Pierre Paulmier, Archbishop of Vienne, in 1541, where he remained for some years, and wrote his famous *Christianismi Restitutio*, first published in 1553. The work has been twice reprinted, first by Dr Meade of London (incomplete), and again by Murr, at Nürnberg, in 1790. Its celebrity is due more to the fact, that it sealed the fate of its author, than to its intrinsic merits, the ideas being obscure, and the style incorrect. After its publication, S. wished to go to Italy, by way of Switzerland, but in passing through Geneva, was arrested and imprisoned at the instigation of Calvin (q. v.). After a long and complicated judicial procedure, S. was condemned to be burned, and the sentence was carried into execution, 27th October 1553—the hapless heretic expiring in agonies. The fate of S., after all the palliations that can be offered are weighed, remains a dark stain on the memory of Calvin (q. v.).

SE'RVIA (Turk. *Syrp*), a principality included within the limits of European Turkey, but almost independent of that power. It is bounded on the north by Austria; on the east by Walachia and Bulgaria; on the south by Rumili and Bosnia; and on the west by Bosnia. Area 21,000 sq. m.; pop. 1,120,000. The country is mountainous and densely wooded. From the interior, numerous chains proceed northward, forming massive barriers both on the eastern and western frontiers, and sloping pretty steeply towards the swampy plains along the Save and the Danube. In the extreme north-east, near Orsova, they reach the very edge of the Danube, and along with the Eastern Carpathians on the opposite shore, imprison the great river within a wall of rock, known as the *Iron Gate* of the Danube. The highest of these chains is the Rudnik Mountains (gathered into a knotty group about the centre of the state), which in the Great Schturaz attains an elevation of 3400 feet. The *Schumadia*, or Forest, extends southwards from Belgrade for 60 miles. Beautiful landscapes are everywhere to be seen. The principal rivers (Serb *Rjeka*) flowing through the country are the Morava and Timok, affluents of the Danube; and the Kolubara, an affluent of the Save, which itself falls into the Danube at Belgrade. The climate is temperate and salubrious, but somewhat cold in the higher regions. The soil in the valleys and level districts is fertile, and equally fitted for the rearing of cattle, the favourite occupation of the people, and the production of corn and wine; but not more than $\frac{1}{24}$th of the land is under tillage, and fully $\frac{7}{10}$ths is forest or wilderness. Oak is the most common wood, but chestnuts and fruit-trees of all sorts abound, especially pears, of which there are whole forests in some places. The mountains are believed to be rich in copper and silver, but mining is almost unknown, and manufacturing industry is in the most backward condition.

Constitution, Internal Administration, &c.—The constitution now in force dates from 1839.—The land is divided into 17 *Ocružia*, or circles (Turk. *Kazas*); each circle has a prefect and a court of the first instance, and sends a deputy to the *Scubsch'tina*, or national parliament. The circles are subdivided into 53 *Srezi*, or arrondissements, and these again into 1152 *Obsch'tine*, or parishes, each of which has a justice of peace court. The civil legislature of S. is modelled after that of Austria. The government comprises a president, who is also minister of Foreign Affairs, together with ministers of the Interior, of Justice, of Finances and Public Worship, of War and Public Works.—The military force is composed of a small body of regulars, under 3000 men, including cavalry and artillery, and an immense national guard of more than 100,000, which can easily be raised to 150,000, for every Serb carries arms, and is trained to military habits. The Turks keep possession of the town and fortress

of Belgrade, where they have a garrison of 15,000 men; and a few other places.

Religion, Education, and Finance.—The inhabitants nearly all belong to the Greek Church, but are independent of the Patriarch of Constantinople. Ecclesiastical affairs are managed by a Metropolitan, whose seat is at Belgrade, and by the three bishops of Uzitza, Shabatz, and Timok. For the few who acknowledge the authority of the pope and the Latin Church, there is a bishop *in part. infid.*, but who resides at Diacobar in Austrian Slavonia. S., according to recent estimates, had 298 churches, 651 parishes, and 652 priests, besides 38 cloisters. It also possessed upwards of 350 educational institutions, including several gymnasia, a Lyceum for philosophical and juristic studies, a theological college, an artillery school, a school of agriculture, and 300 elementary schools for boys, and 13 for girls! These schools are not under the control of the clergy, and education is consequently making rapid progress. In 1864, the revenue of the country amounted to 22,253,344 piastres, and the expenses to 24,487,513 piastres.

Character.—The Servians are distinguished for the vigour of their frame, their personal valour, love of freedom, and glowing poetical spirit. Their manners and mode of life are exceedingly picturesque, and strongly prepossess a stranger in their favor. They rank among the most gifted and promising members of the Slavic family.

History.—In the earliest times of which we have record, S. was inhabited by Thracian or Illyrian races—the Bessi, Scordisci, Dardanii, and Triballi. Shortly before Christ, it was subjugated by the Romans, and under the name of *Mœsia Superior*, formed part of the province of Illyricum, whose fortunes it shared during the vicissitudes of the empire. Overrun successively by the Huns, Ostrogoths, Longobards, &c., it reverted to the Byzantine rulers about the middle of the 6th c., but was wrested from them by the Avars in the 7th c., to oppose whom the Emperor Heraclius, about 636, invoked the aid of the Serbs from Eastern Galicia. The Serbs obeyed the call, and in less than two years drove the Avars from the land, over which they themselves spread in great numbers, their settlements extending from the Morava as far west as the Dalmatian Alps and the Adriatic, and from the Save as far south as the Balkan and Lake Scutari. About the middle of the 9th c., they were converted to Christianity by missionaries sent by the Emperor Basilius, but this did not in the least abate their natural ardour for battle, and for nearly 200 years they were almost constantly at war with the neighbouring Bulgarians—the inveterate enemies of their Byzantine liege lord. In 1043, however, Stephen Bogislav expelled the imperial governors; and during 1050—1080, his son, Michael, made himself wholly independent, took the title of king of S., and procured the recognition of his royal dignity from Pope Gregory VII. For the next hundred years, the Serbs had to fight hard to maintain their independence, but the struggle terminated in their favour; and in 1165, Stephen Nemanja founded a dynasty which lasted for two centuries, during which period the kingdom of S. attained the acme of its power and prosperity. Under Stephen Dushan (1336—1356), the greatest monarch of the Nemanja dynasty, it embraced the whole of Macedonia, Albania, Thessaly, Northern Greece, and Bulgaria. The progress of the Turkish arms, however, was fatal to its welfare, and in 1389 King Lazar fell in the disastrous battle at Kossovopolje. Sultan Bajazet divided the country between Lazar's son, Stephen, and Lazar's son-in-law, Vuk Brankovitch, but compelled both to pay tribute, and to follow him in war. Gradually the Serbs sunk more and more under the Turkish yoke, until, in 1459, S. was thoroughly subjugated by the Sultan Mahmud. It was uniformly the theatre of the bloody wars between Hungary and Turkey, and frequently suffered the uttermost horrors of devastation. Prince Eugene's brilliant successes for a moment flashed a ray of hope into the miserable hearts of the long-suffering Serbs, and by the treaty of Passarowitz (1718), a considerable portion of the country was made over to Austria; but in 1739 it reverted to Turkey, and for the next 60 years the cruelty and oppressions of the Pashas and their Janizaries surpasses all belief. At length the unhappy people could endure the tyranny of their foreign masters no longer, and in 1801 an insurrection broke out, headed by George Czerny (q. v.), which, by the help of Russia, ended in the triumph of the patriots, and in the election of Czerny by the people as Prince of Servia. The invasion of Russia by France, however, left the Serbs at the mercy of their late rulers, and the war again broke out. Czerny was forced to flee, and the tyranny of the Turks became more ferocious than ever. Again the people flew to arms under the leadership of Milosch Obrenovitch, and were a second time successful in winning back their liberties. Milosch was chosen Prince of Servia in 1815, and confirmed in his office by a hatti-sherif of the sultan. He ruled with indifferent success till 1839, when he was forced to abdicate; but in 1858 he was restored to his former dignity, which was made hereditary in his family. Prince Milosch died in 1860, and was succeeded by his son, Prince Michael III.

Language and Literature.—The Servian language, called also the Illyrian, belongs to one of the four great divisions of the Slavic family, and is more nearly allied to Russian than to Polish or Bohemian. It is distinguished from the other members of its division by the predominance of vowels, and consequently by its soft, melodious resonance. This character it owes in part to the influence of the Italian and Greek languages—the former influence being the result of commercial intercourse; the latter, of community of religious belief. The long domination of the Turks has also left unmistakeable traces on the Servian tongue; nevertheless, it has on the whole preserved a genuine Slavic character, possessing along with the other members of that family a complete system of declension and conjugation, along with a free syntax. The old classical modes of speech and metres are also imitated with facility in it. According to Schafarik, it is spoken (in the three dialects—Herzegovic, Razavic, and Syrmic) by more than 7,000,000 people, of whom 4,500,000 are under Austrian, 2,500,000 under Turkish, and a few under Russian authority. While their kinsmen, the Croats and Winds, use Roman characters, the Serbs proper employ the alphabet of Cyrill. Vuk Stephanovitch published a *Grammar of the Servian Language* at Vienna, in 1814, which was translated into German by Grimm (Berl. 1824); and subsequently a *Dictionary* (2d ed. Vienna, 1852). Very useful also are Berlic's *Illyrian Grammar* (Agram, 1842; Vienna, 1854); and Mazuranitz and Uzarewitz's *Dictionary* (Agram, 1842). See Schafarik's *Serb. Lese-körner oder historisch-kritische Beleuchtung der Serb. Mundart* (Pesth, 1833).

After their conversion to Christianity, the Serbs, like the Russians, employed the old Slavic church-language in writing, but in two different styles, one called the church style, and the other the chancery or legal style. The most important monument of the latter is the 'Law-book,' published by King Stephen Dushan, though the oldest extant specimens go back as far as the 11th century. The

literary remains of the former are more numerous, and embrace ecclesiastical, devotional, and historical works, for the most part composed by the clergy and the monks. With George Brankovitch (born 1645, died 1711), who wrote a *History of Servia* from the origin of the nation to his own time, this first or medieval period in Servian literature closes. The second or modern period is characterised in its commencement by an effort to raise the spoken language of the Serbs to the dignity of a written language. The consequence was, for a considerable time, the literary language of S. was a chaos of confusion, writers not appearing able to make up their minds which dialect to use, and spoiling their productions by a barbarous mixture of both; and it was not till Vuk Stephanovitch published his *Grammar of the Servian Language* (1814), and his *Songs of the Servian People*, that the victory of the reformers was complete. Since then, the spoken language of S. has also become the language of literature. These Servian popular songs or ballads constitute by far the finest part of Servian literature. The picturesque scenery of the land, and the free solitary life led in the mountain ranges, kindled the imagination of the people, and awoke the voice of song at an early period. Some of the ballads—now so widely known throughout Christendom by means of translation—go back to a period anterior to the appearance of the Turks in Europe. In a wonderful manner, they combine the rude strength, spirit, and naïveté characteristic of the ballad everywhere, with oriental fire and Greek plasticity. They are invariably unrhimed, but preserve at the same time a rhythmic measure. See Kapper's *Volkslieder der Serbien* (2 vols. Leip. 1852); and Bowring's *Servian Popular Poetry* (Lond. 1827), and Owen Meredith's *Serbske Pesme* (Lond. 1861); the last, however, a book of doubtful honesty. Among the poets who acquired distinction in the first part of the century, and have employed the vernacular, the most important is Lucyan Muschiki (died 1837), Archbishop of Carlovitz, whose *Poems* appeared at Pesth in 1838. Of recent or living Servian poets, the most gifted are Branko Raditshevitz and Jovan Ilitz. As yet, science has made little progress. In another branch of the Servian people—the so-called Illyrians, especially the Dalmatians, who profess the Roman Catholic faith—literature received an earlier and more artistic development than among the Serbs of the Greek Church. In the 12th c., a priest of Ducla (Diocleа) wrote a Chronicle, first in Slavic, and afterwards in Latin, fragments of which are still extant. During the 13th and 14th centuries, devotional works in the vernacular were numerous, and towards the end of the 15th c. the republic of Ragusa (Slav. Dubrovnik) obtained the name of the 'Illyrian Athens' on account of the brilliant success with which it cultivated literature, art, and science. Epic, lyric, and dramatic poetry, history and jurisprudence, are all admirably represented. The list of its poets is particularly large. Towards the end of the 18th c., literary activity abated among the southern or Illyrian Serbs, but at the same time began to increase in the north, especially in Croatia and Hungary.—See Ristitz, *Ueber die Serb. Literatur* (Berl. 1853), and, in English, Talvi's *Historical View of the Languages and Literature of the Slavic Nations* (New York, 1850).

SERVIA, Woiwodina of, and **BANAT OF TEMES.** See Austria and Banat.

SERVICE (*Pyrus domestica* [see Pyrus], the *Sorbus domestica* of many botanists), a tree of fifty or sixty feet in height, with pinnated leaves, which are downy beneath, and their leaflets serrated upwards, and small white flowers in panicles, a rare native of England, found also in various parts of Europe, the west of Asia, and the north of Africa, and cultivated for its fruit, which is obovate, and about an inch in length, resembling a small pear, but pleasant only in a doughy and over-ripened state, like the medlar. It is more cultivated in Italy, Germany, and France than in Britain. The tree is of very slow growth, and attains a great age. The timber is valuable, very heavy, fine-grained, and susceptible of a high polish, possessing a strength and durability which particularly adapt it for some purposes of the machine-maker. It is used also for making mathematical rulers, &c.—The name Wild Service is given to an allied species, *Pyrus*



Wild Service (*Pyrus torminalis*).
a, fruit; *b*, flowers.

torminalis, also called the Sorb, a common native of the middle and south of England, and of the middle and south of Europe—a small tree, with a spotted fruit, considerably larger than that of the common hawthorn, which, like the fruit of the true service, becomes mellowed and pleasant by keeping, and is regularly brought to the market in many parts of Europe. Large quantities are brought to London from Hertfordshire. The dried fruit is used in some places as a cure for diarrhœa. The wood is highly valued. It is hard and tough, yellowish-white, with brownish-red and dark-brown streaks.

SERVICE AND WORK is the name usually given to an action brought by a workman who has done work to order, or on request, or has been engaged for a specific time.

SERVICE OF HEIRS is a proceeding in the law of Scotland by which the heir of a deceased owner of land has his relationship recognised and declared, and his feudal title to the land completed.

SE'RVITUDE, a name borrowed by the law of Scotland from the Roman law, to denote that kind of right or interest which a person often has in land of which he is not the owner, as a right to cut turf, &c. Servitudes are divided into predial and personal. A predial servitude is a right constituted over one subject or tenement by the owner of another subject or tenement; while a personal servitude is constituted over a subject in favour of a person without reference to possession of property. The only kind of personal servitude is life-rent or usufruct. The predial servitudes are those usually

referred to under the head of servitude. Such a servitude being constituted in respect of the ownership of property, passes to third parties with such ownership. The tenement over which the servitude exists is called the servient tenement, and the other is called the dominant tenement. Predial servitudes are again subdivided into rural and urban, according as they affect land or houses. The usual rural servitudes are those of passage or road, pasture, feal and divot, aqueduct, thirlage, &c. Passage or road is the right which a person has to walk or drive to his house over another's land. Pasture is the right to send cattle to graze on another's lands. Feal and divot is the right to cut turfs or peats on another's land. Aqueduct is the right to have a stream of water conveyed through another's lands. Thirlage is the right to have other people's corn sent to one's mill to be ground. The urban servitudes are stillicide, light, *oneris ferendi*, &c. Stillicide is the right to have the rain from one's roof to drop on another's land or house. Light is the right to prevent another from building so as to obstruct the windows of one's house. *Oneris ferendi* is the right of the owner of the flat above to have his flat supported by the flat beneath.

SE'RVIUS TU'LLIUS. See Rome.

SE'RVUS SERVO'RUM DE'I (Lat., Servant of the Servants of God), a form of subscription adopted by the Roman pontiffs from the days of Pope Gregory the Great, by whom, according to his biographer, Paul the Deacon, it was assumed as a practical rebuke of the ambitious assumption of the title of 'Ecumenical (or universal) Patriarch,' by John, surnamed Nesteutes, or the Faster, the contemporary Patriarch of Constantinople. Gregory is said, indeed, by Paul to have been the first Christian bishop by whom this humble form was employed. This, however, is certainly a mistake, the same designation having been frequently used by bishops before the time of Gregory. Gregory was probably the first of the bishops of Rome to adopt it as a distinctive title. It is found in all the letters of Gregory which Venerable Bede has preserved in his History.

SE'SAMOID BONES are small bones met with in the substance of the tendons of muscles in the neighbourhood of certain joints. They derive their name from the Gr. *sēsamē*, a kind of Indian grain, which they were supposed to resemble. In the human subject, the patella is the best example; and beside it, they are commonly met with only on the palmar aspect of the joint which unites the metacarpal bone with the first phalanx, and in the corresponding position in the toe, there being two in each position, and their object being to increase the leverage of the short flexor muscles of the thumb and toe. They are much more abundant in the great majority of mammals than they are in man.

SE'SAMUM, a genus of plants of the natural order *Bignoniaceæ*, suborder *Pedaliaceæ*, a suborder characterised by wingless seeds, and placentæ with woody lobes attached to the inner wall of the fruit. The calyx of S. is five-parted; the corolla bell-shaped and five-parted, the lowest lobe prolonged; the stamens four, two longer than the others, and a rudimentary fifth stamen; the capsule is oblong, almost four-celled, two-valved, many-seeded. The species are natives of India and Africa, and are annual plants, covered with hairs, their flowers solitary in the axils of the leaves, on very short stalks. They are so similar as to be sometimes reckoned mere varieties of one species, *S. Indicum*. The sweet oleaginous seeds are used in some countries, as in Central Africa, for making a kind of hasty-pudding. In Egypt, they are eaten, strewed on cakes. The bland fixed oil of S., obtained from the seeds by expression, is used as an article of food, and for medicinal purposes, like olive oil. It keeps long without becoming rancid. It is much used by the women of Egypt as a cosmetic. For the sake chiefly of its oil, S. is much cultivated in India, China, Japan, and in many tropical and subtropical countries, and has been cultivated from very ancient times. It is too tender for the climate of Britain. The oil-cake, mixed with honey and preserved citron, is an oriental luxury. The leaves of S. abound in a gummy substance, which they readily impart to water, making a rich bland mucilage, which is used in the southern parts of the United States as a demulcent drink. S. is sometimes called *Tilseed*.

SESBA'NIA. See Dhunchee.

S'ESHA is, in Hindu Mythology, the great king of the serpent race, on which Vishn'u reclines on the primeval waters. He has a thousand heads, which also serve as a canopy to Vishn'u; and he upholds the world, which rests on one of his heads. His crest is ornamented with jewels. Coiled-up, S. is the emblem of eternity. He is often also called *Vâsuki* or *Ananta*, the eternal.

SESO'STRIS, the Greek name of a celebrated Egyptian monarch, who is supposed to have conquered all Asia and Ethiopia. His name has passed into the series of those conquerors who have almost achieved universal empire. According to the Greek legendary history, when S. mounted the throne of Egypt, he began his scheme of conquest, first dividing Egypt itself into 36 nomes, placing his brother as regent, and placing on him injunctions not to assume the diadem, or interfere with the royal harem. S. then marched at the head of a large army, and invaded Libya, Arabia, Asia, penetrating further east than Darius. Advancing through Asia Minor, he invaded Europe, and subdued Thrace and Scythia, leaving a colony at Colchis on his return. In the south, he subdued Ethiopia, and placing a fleet on the Red Sea, conquered the adjacent isles, and extended his dominions to India itself. On his return to Egypt from his northern campaigns, his brother, who had disobeyed his instructions, endeavoured to destroy him, by inviting him to a banquet at Daphnæ, and treacherously attempting to burn him and his whole family by firing the house. S. threw two of his children into the fire, and making a bridge of their burning bodies, escaped. S., in his triumphs, dragged his captives attached to the wheels of his chariot. The captives were employed on the public works, the enlargement of the Hephæsteum at Memphis (q. v.), and other temples, and in the construction of canals and mounds. Memorials of his reign, it was said, were left as steles or tablets in the conquered countries; and Herodotus saw some in Palestine, which are supposed to be the tablets of Ramesses II. (see Ramesses), still existing in the pass of Nahr-el-Kelb, or the Lycus, and the sculptured rock at Nymphi, near Smyrna. S. is said to have grown infirm and blind after a reign of 33 years, and to have ended his days by his own hand.

Not only does the greatest confusion and difficulty about identifying this monarch exist among modern, but also in the classical authors. Herodotus places his reign long before that of Cheops of the 4th dynasty. Dicæarchus makes him rule 3712 B. C., and is followed by Aristotle and other authors. Bunsen supposes that there were more than one monarch of this name, and that one was Tosorthos, of the 3d dynasty; another, Sesortesen II., of the 12th dynasty. Lepsius conjectures that he is the

Sethos I. and Ramesses II. of the 19th dynasty. But the exploits of Sesostris seem to be a conglomeration of the conquests of the kings of the 18th and 19th dynasty, especially the Thothmes and Ramesses (q. v.), who extended the empire of Egypt far to the west and east. No one monarch of the Egyptian monarchy can represent Sesostris.—Herodotus, ii. c. 102; Diodorus, i. c. 55—57; Val. Flaccus, v. 419; Strabo, xvi.; Wilkinson, *Mann. and Cust.* i. 99—106; ii. 70; iii. 190; Lepsius, *Einleit.* s. 278; Bunsen, *Aegyptens Stelle*, book ii. 85, 86, 312—324.

SESQUIA'LTERA, one of the compound stops of the organ, composed of either five, four, three, or two ranks of open metal-pipes tuned in thirds, fifths, and octaves to the diapason.

SE'SSA, a city of Southern Italy, province of Terra di Lavoro, about 38 miles north-north-west of Naples. Pop. 19,449. It has a fine cathedral, a theological seminary and colleges. There are manufactories of woollen cloth. The neighbouring soil is fertile. S. is a very ancient city; it was the capital city of the Aruncii, was afterwards colonised by the Romans in 314 A. U. C., and was very flourishing under the Roman empire. It was raised to a duchy in the middle ages.

SESSION, COURT OF. See COURT OF SESSION.

SESSIONS. See JUSTICE OF THE PEACE, QUARTER SESSIONS.

SESTE'RTIUS, a Roman coin, was the fourth part of the *Denarius* (q. v.), and thus contained at first 2½ *asses* or *libræ*. The name is an abbreviation of the Latin *semis-tertius*, which was their mode of expressing 2½; and their custom was, to derive the names of all their coins from the foundation of their money-system, the *As* (q. v.). The symbols for it were indifferently HS or IIS, the former being only a modification of the latter, which expresses two units, and S for the additional half-unit (*semis*). In the Latin classics, the phrase *sestertius-nummus*, or merely *nummus*, is frequently employed to denote this coin. When the *Denarius* (q. v.) was made to contain 16 *asses*, the relation between it and the sestertius was preserved, and the latter from that time contained 4 *asses*, though the name, which was now no longer significant, was preserved. Up till the time of Augustus, when the relation of the denarius to the *as* was changed, the sestertius was worth 2 pence ½ farthing sterling, but after this period it was reduced to 1 penny 3½ farthings sterling. The sum of 1000 sestertii was called *sestertium* (after Augustus, = £7, 16*s*. 3*d*.), which was the 'money of account' (never a 'coin') used in the reckoning of large sums of money.

SE'STRI LEVA'NTÉ, a seaport of North Italy, 26 miles east-south-east of Genoa. It is situated on a little bay near the mouth of the Gromolo, and has five foreign consulates. Its Church of the Nativity has some valuable paintings. Pop. 8426.

SE'STRI PONE'NTÉ, a town of North Italy, 4 miles west of Genoa, stands on the high road which runs along the sea-coast. There is a large government factory of tobacco. Pop. 6005.

SETA'RIA. See MILLET.

SETHE. See COAL-FISH.

SE'THITES, the name given to an obscure Gnostic sect of the 2d c., allied to the Ophites, or worshippers of the serpent; they belonged to that class of religionists who, in evolving what they regarded as their system, approached paganism. Accepting the Christian mode of thought and its terminology, they utterly disregarded the great facts of Scripture history, maintaining that Seth reappeared in the person of the Messiah, and affirming that they possessed books written by him.—See Neander's *Kirchengeschichte* (Bohn's translation, vol. ii. page 115).

SE'TON, in Surgery, is an artificially produced sinus or channel, through which some substance—e. g., a skein of cotton or silk, or a long flat piece of india-rubber or gutta-percha—is passed so as to excite suppuration, and to keep the artificially formed openings patent. (The term is, however, very often employed to designate the inserted material.) Setons are established in the subcutaneous tissue of the body (1) as counter-irritants, or (2) to act as a drain on the system at large, or (3) to excite inflammation and adhesion. For the purposes of counter-irritation, setons are usually inserted in the neighbourhood of the affected parts; but when intended to act as a drain on the system at large—e. g., in threatened head-affections—the nape of the neck is the part always selected. The operation is very simple. A longitudinal fold of skin over the spines of the cervical vertebræ is raised by the fingers from the deeper structures, and is transfixed by the seton-needle rather obliquely, so that one of the openings shall be rather more dependent than the other. The needle must pass somewhat deeply through the subcutaneous tissue, as, if it passed immediately beneath the skin, the latter would probably slough over the whole track of the wound. The inserted material should be smeared with oil, and may be allowed to remain undisturbed for four or five days, till there is a free discharge of matter, after which a fresh portion should be drawn daily through the wound.

For the purpose of exciting local inflammation and adhesion (which is a result of the inflammation), setons are employed in the treatment of hydrocele, enlarged bursæ, ranula, bronchocele, ununited fractures, &c. In the two last-named cases, their use is, however, not unattended by danger.

The word *seton* is derived from the Latin *seta*, a hair, because hairs were originally employed as the inserted material. Indeed, at the present day, it is the custom of many of the nomadic tribes of Central Asia to insert a hair into the heels of their prisoners, which lames them to such an extent as to prevent their escape.

SETT, in Scotch Law, was used to denote the constitution of a burgh, whether founded on immemorial usage or modelled by the Convention of Burghs (q. v.).

SETTÉ COMMU'NI DI VICE'NZA, a district consisting of seven communes or parishes in the neighbourhood of Vicenza, the language and population of which are plainly Teutonic, and have maintained themselves pure and unmixed in the midst of a Latin people from the days of the Roman republic. The inhabitants are believed by antiquaries to be descendants of the remnant of the Cimbrian army which was defeated with great slaughter by Marius, and are supposed to have escaped to the mountains, and there fixed a permanent settlement. Their language is perfectly intelligible to any German scholar. Specimens of this dialect, and of a similarly isolated Teutonic dialect which is found near Verona, are given by Adelung in the *Mithridates*, ii. p. 215.

SETTER, a kind of dog which derives its name from its habit of *setting* or crouching when it perceives the scent of game, instead of standing, like the pointer. Setters, however, are now trained to adopt the pointer's mode of standing whilst marking game. The S. was originally used to assist in the capture of game by the net. It is supposed to derive its origin from a mixture of the pointer and the spaniel. It is larger than the spaniel; its hair is less smooth than that of the pointer, and has more

of the waved character of that of the spaniel, to which there is a resemblance also in the ears. The tail is bushy. There are several breeds of the setter. The general colour of the *English S.* is a white ground, with large spots or blotches of liver-colour or red. The *Irish S.* has larger legs in proportion to the size of the body. The *Russian S.* is



English Setter.

covered with woolly fur, much matted together. Each of these breeds has its peculiar merits. All setters have the soles of the feet well covered with hair, so that they can bear hard work on rough ground. They soon become exhausted, however, unless they have access to water. The S. is much employed by sportsmen. It is one of the most affectionate, gentle, and intelligent of dogs.

SETTLE, Elkanah, was born at Dunstable, in the year 1648. He completed his education at Trinity College, Oxford, which he left without taking a degree, and repaired to London, to seek his subsistence by literature. In 1671, he made something of a hit by the production of his tragedy of *Cambyses;* and the Earl of Rochester and others, wishing to annoy and insult the great Dryden, loudly hailed in him the superior genius of the two. Through the influence of Rochester, to his next tragedy, *The Empress of Morocco*, the unwonted honour was accorded of being played at Whitehall by the lords and ladies of the court, and in this way a great run was secured for it when it came before the general public. In the insolence of success, the author printed along with it a Preface, in which Dryden was severely assailed. Solely in virtue of the quarrel thus engendered is S. now remembered. In his great satire, *Absalom and Achitophel*, Dryden scourged him with his scorn, so that in some sort he survives for us, if only as a shrieking ghost. Having no real strength of talent, he speedily relapsed into obscurity. The post of poet-laureate for the city he had obtained, and he continued to retain. By writing in this capacity verses for city pageants and festivities, and producing pieces to be acted in the booths of Bartholomew Fair, the some-time rival of Dryden was fain to eke out a wretched subsistence. In his destitute age, he was admitted to the Charter-house, where in 1723 he died, his works having predeceased him.

SETTLED ESTATE, in English Law, means an estate held by some tenant for life, under conditions more or less strict, defined by the deed.

SETTLEMENT, in English Law, is used in two senses. In one case, it means the mode of securing property on married parties, so as to regulate the succession in the event of the death of either, or it may regulate the succession of parties not married. In poor-law matters, it means that kind of right which a pauper has to support by the parish by reason of his being born there, or of his renting a tenement or acquiring estate, &c. It often happens that a person becomes chargeable, that is, is entitled to be relieved by a parish in which he has no settlement, and the relieving parish can forthwith remove him to his parish of settlement. See Removal of Paupers.—In Scotland, settlement, besides the above meanings, also means the general will or disposition by which one regulates the disposition of his property after death.

SETU'BAL (frequently and erroneously called by the English St Ube's) is an important seaport city of Portugal, in the province of Estremadura, 20 miles south-east of Lisbon. It stands on the north side of the Bay of Setubal, which forms a magnificent harbour, though the entrance to it is obstructed by sandbanks. The harbour is furnished with a light-house and with broad and handsome quays, and is protected by five forts; but the valley in which the town itself stands is completely commanded by the heights in the vicinity. The town owes its importance chiefly to its trade in wine and in sea-salt, but fishing is also carried on with considerable activity. In 1862, 346 vessels, laden with 64,221 tons of salt, valued at £55,630, 15*s*., sailed from the port; of these vessels, 24, of 3629 tons, were British. S. is the old Roman *Cetobriga*. Pop. 17,000.

SEVEN: frequently used as a mystical and symbolical number in the Bible, as well as among the principal nations of antiquity (the Persians, Indians, Egyptians, Greeks, Romans, &c.). The reason for the preference of this number for sacred use has been found in its consisting of *three*—the number of the sides of a triangle—and *four*—the sides of a square, these being the simplest rectilineal figures:—or in other equally vague circumstances. The real reason, however, seems to be astronomical, or rather astrological, viz., the observation of the seven planets and the phases of the moon—changing every seventh day. (See Week.) As instances of the use of this number in the Old Testament, we find the Creation completed in seven days, wherefore the seventh day was kept sacred; every seventh year was Sabbatical, and the seven times seventh year ushered in the Jobel-year. The three *Regalim*, or pilgrim festivals (Passah, Festival of Weeks, and Tabernacles), lasted seven days; and between the first and second of these Feasts were counted seven weeks. The first day of the seventh month was a 'Holy Convocation.' The Levitical purifications lasted seven days, and the same space of time was allotted to the celebration of weddings and the mourning for the dead. In innumerable instances in the Old Testament and later Jewish writings, the number is used as a kind of round number. In the New Testament we have the churches, candlesticks, stars, trumpets, spirits, all to the number of seven; and the seven horns, and seven eyes of the Lamb. The same number appears again either divided into half (3½ years, Rev. xiii. 5, xi. 3, xii. 6, &c.), or multiplied by ten—seventy Israelites go to Egypt, the exile lasts seventy years, there are seventy elders, and at a later period there are supposed to be seventy languages and seventy nations upon earth. To go back to the earlier documents, we find in a similar way the dove sent out the second time seven days after her first mission, Pharoah's dream shews him twice seven kine, twice seven ears of corn, &c. Among the Greeks the seven was sacred to Apollo and to Dionysos, who, according to Orphic legends, was torn into seven pieces; and it was particularly sacred in Eubœa, where the number was found to pervade, as it were, almost every sacred, private, or domestic relation. On the many ancient speculations which connected the number seven with the

human body and the phases of its gradual development and formation, its critical periods of sicknesses—partly still extant as superstitious notions —we cannot here dwell. The Pythagoreans made much of this number, giving it the name of Athene, Hermes, Hephaistos, Heracles, the Virgin unbegotten and unbegetting (i. e., not to be obtained by multiplication), Dionysos, Rex, &c. The 'seven sacraments,' the 'seven Free Arts,' the 'seven wise men,' and many more instances, prove the importance attached to this number in the eyes not only of ancient but even of our own times. That it played an immense part in the superstitions of the middle ages need hardly be added.

SEVEN DOLOURS OF THE BLESSED VIRGIN MARY, Feast of, a modern festival of the Roman Catholic Church, which, although bearing the name of devotion to the Virgin Mary, in reality regards those incidents in the life and passion of Christ with which his mother is most closely associated. This festival is celebrated on the Friday preceding Palm Sunday (q. v.). The 'dolours' or sorrows of the Blessed Virgin have long been a favourite theme of Roman Catholic devotion, of which the pathetic *Stabat Mater Dolorosa* is the best known and most popular expression; and the festival of the Seven Dolours is intended to individualise the incidents of her sorrows, and to present them for meditation. The seven incidents referred to under the title of 'dolours' are: 1. The prediction of Simeon (Luke ii. 34); 2. The flight into Egypt; 3. The loss of Jesus in Jerusalem; 4. The sight of Jesus bearing his cross towards Calvary; 5. The sight of Jesus upon the cross; 6. The piercing of his side with the lance; 7. His burial. This festival was instituted by Pope Benedict XIII. in 1725.

SEVEN SLEEPERS, the heroes of a celebrated legend, which is first related by Gregory of Tours in the close of the 6th c. (*De Gloria Martyrum*, c. 95), but the date of which is assigned to the 3d c., and to the persecution of the Christians under Decius. According to the narrative, during the flight of the Christians from the persecution, seven Christians of Ephesus took refuge in a cave near the city, where they were discovered by their pursuers, who walled up the entrance, in order to starve them to death. A miracle, however, was interposed on their behalf: they fell into a preternatural sleep, in which they lay for nearly 200 years. The concealment is supposed to have taken place in 250 or 251; and it was not till the reign of Theodosius, 447, that they were reanimated. On awaking, they imagined that their sleep had been but of a single night; and on one of the party (supposing the persecution still in progress) going into the city to purchase provisions privately, he was amazed to find erected in triumph on the churches and other buildings, a cross, which, as it seemed, but a few hours before, he had seen the object of contempt and blasphemy. When their wonderful history became known, they were conducted in triumphant procession into the city of Ephesus; but they all died at the same moment, as if by one common and mysterious destiny. The same legend reappears with variations at later periods of Christian history.

SEVENTH-DAY BAPTISTS. See Sabbath.

SEVEN WISE MASTERS is the title of a medieval collection of novels, important both from its contents and its wide-spread popularity. The idea of the work is as follows: A certain prince's son, instructed in all kinds of wisdom by seven sages, finds, from an examination of the stars, on his return to his father's court, that he is in danger of losing his life, if he speaks a word within seven days. His stepmother, whose allurements he had repelled, endeavoured in revenge to persuade his father to put him to death, and each day related an artfully constructed story, with the view of furthering her wicked purpose, but its effect was daily neutralised by a rival narrative told by each of the sages. At last, on the expiry of the seven days, the prince himself was enabled to disclose the base designs of his stepmother.—The work is undoubtedly of oriental origin, yet neither the period when it was composed, nor how far it spread through the East, can be ascertained with sufficient accuracy. According to Masudi, it existed in Arabic as a translation from Indian sources before the 10th c., but none of the extant Arabic versions go back so far. Nearest to the original form appears to stand the *Eight Nights* of Nakhschebi, a Persian adaptation of the Indian *Tutiname* (Brockhaus, Leip. 1845). It passed into the literature of Western Europe in the 11th or 12th c., through the medium of two redactions, a Hebrew and a Greek, the latter by Andreopulos, under the title of *Syntipas* (see *Das Buch von den sieben weisen Meistern*, translated from the Hebrew and Greek by H. Sengelmann, Halle, 1842; *Syntipas* being republished by Boissonade, Paris, 1828). The work was disseminated through Christendom; sometimes in a complete form; sometimes only particular novels were reproduced, under all sorts of names, and with all sorts of modifications; sometimes in verse, sometimes in prose. Latin versions began to appear about the beginning of the 13th c., and Keller has published a French metrical one, from a MS. of 1284 (*Li Romans des Sept Sages*, Tüb. 1836), and Henry Weber an English metrical one (third vol. of the *Metrical Romances*, Edin. 1810). There are several German versions, dating from the 14th century. In the 15th c., a popular German chap-book, *Von den sieben weisen Meistern*, was frequently reprinted (the first edition is dated Augsb. 1473), and is included by Simrock in his collection of German *Volksbücher*.

SEVEN WISE MEN, the collective designation of a number of Greek sages, who lived about 620—548 B. C., and devoted themselves to the cultivation of practical wisdom. Their moral and social experience was embodied in brief aphorisms, sometimes expressed in verse, sometimes in prose. The names of the Seven, as usually given, are Solon (q. v.), Thales (q. v.), Pittacus (q. v.), Bias (q. v.), Chilon, Cleobulus, and Periander of Corinth; but there is not absolute unanimity among the ancients either as regards the names, the number, the history, or the sayings of these famous sages. The fragments of wisdom attributed to them which have come down to us are to be found in Orelli's *Opuscula Græcorum Veterum, Sententiosa et Moralia* (Leip. 1819), and have been translated into German by Dilthey in his *Fragmente der sieben Weisen* (Darmstadt, 1835).

SEVEN WONDERS OF THE WORLD were, in ancient times, reckoned to be the Pyramids of Egypt, the Hanging Gardens of Semiramis at Babylon, the Temple of Diana at Ephesus, the Statue of Jupiter at Athens by Phidias, the Mausoleum (q. v.), the Colossus (q. v.) at Rhodes, and the Pharos of Alexandria. This cycle of seven wonders originated among the Greeks after the time of Alexander the Great, and they were described in a special work by Philo of Byzantium, which has been edited by Orelli.

SEVEN YEARS' WAR, The, was the third, last, and by far the longest (1756—1763) and most terrible of the contests for the possession of Silesia (q. v.). During the two former wars, the Empress Maria Theresa had plenty of other work on hand in

maintaining her claims to the Austrian dominions (see SUCCESSION, WAR OF AUSTRIAN) to offer any very effective resistance to the aggression of Frederick the Great of Prussia; but after emerging triumphantly from this contest, she took advantage of the circumstance that the king of Prussia was on bad terms with all the chief continental powers except Turkey and Spain, to renew the struggle for Silesia, which had been snatched from her at the moment of her greatest straits. She found the Czarina Elizabeth, the King of Poland and Elector of Saxony, and Louis XV. of France (or rather Madame de Pompadour), ready to enter into an offensive and defensive treaty with her. On the other hand, Britain (then at war with France) engaged to assist Prussia with an army in Hanover, and with subsidies when necessary. Resolving to anticipate his enemies, and secure a safe basis for future operations, Frederick made a sudden advance (August 1756) on Dresden with 60,000 men, took possession of the country, which he governed from this time with slight intervals to the end of the war, and cooped up the Saxon army, 18,000 strong, between Pirna and Königstein. On the Austrians under Browne, advancing to relieve their allies, they were met by Frederick at Lobositz (October 1), and after an indecisive contest, were obliged to retreat. The Saxons then surrendered (October 14), and were mostly incorporated with the Prussian army, which went into winter-quarters in Saxony and Silesia. —The *second campaign* (1757) began under more favourable auspices for the Austrian coalition, as the rapid action of Frederick had taken it somewhat by surprise in the preceding autumn; besides, Sweden (subsidised by France) became a fourth in the coalition, in order to recover Pomerania, and the German Reich or Empire raised an army, 33,000 strong, to assist Austria. A combined attack was now made by a French army (100,000) on Hanover; another French army (30,000) on Hesse-Cassel (an ally of Prussia), with a view to reach Saxony; an Austrian army from Bohemia on Saxony and another on Silesia, both of them at first united under Marshal Daun, but latterly (1760) separated, under Daun and London; the Russians (100,000) on the east and north-east; and the Swedes (22,000) in Pomerania; while the imperial army sometimes joined the southern French, and sometimes the west Austrian armies. To oppose these armies, numbering in all 430,000, Frederick had the combined British-Hanoverian-Hessian army (60,000) in Hanover, and a Prussian army of 200,000 strong, which was distributed, as need required, over the various points attacked; but he relied much on the rapidity of his movements, and the harmonious completeness of his plans. In April, Frederick, leaving a corps of 24,000 under Lewald to resist the Swedes and Russians, invaded Bohemia, drove in the advanced corps of the Austrians upon their main army, which he then completely routed at Prague (May 6), with a loss on his side of 18,000, and of 19,000 on the part of the Austrians. Marshals Schwerin (Prussian) and Browne (Austrian) fell in this conflict. Frederick immediately invested Prague, to which Prince Charles of Lorraine, with 46,000 men, had retreated; but Daun, who advanced from Moravia to its relief, inflicted on the Prussians a crushing defeat at Kolin (June 18), and forced them to retire from Bohemia. The north French army had meanwhile, under Marshal d'Estrees, advanced into Hanover, defeated the incapable Duke of Cumberland at Hastenbeck (July 26), and compelled him to capitulate, on condition that the whole of his army, excepting the Hanoverians, should be disbanded. But the British government refused to ratify this shameful treaty, and speedily raised another army of similar composition, which was placed under the command of Duke Ferdinand of Brunswick, an able leader, who again drove back the French, and proved himself so capable to hold them in check, that Frederick ceased to have any apprehensions from this quarter. The south French army under Soubise had also advanced in conjunction with the Imperialists under the Prince of Hildburghausen in the direction of Saxony, but Frederick was not prepared to lose this valuable vantage-ground, and falling upon them at Rossbach (q. v.) (November 5), he put them completely to rout. During his absence, however, the Austrians had broken into Silesia, routed his armies, and compelled them to retire; so, compelled to use the utmost expedition in returning, he collected a small army, defeated a thrice as numerous force of Austrians under Prince Charles of Lorraine at Leuthen (December 5), and recovered Silesia. On the east, the Russians had appeared in great force, captured Memel, committing the most horrible devastations, and had routed Lewald at Grossjägerndorf (August 30), when the change of Russian policy due to the illness and apparently impending demise of the czarina, caused them to relinquish almost all their conquests; Lewald then attacked and defeated the Swedes, driving them under the walls of Stralsund. Thus closed the second campaign, leaving matters very much as they were at the commencement.—Duke Ferdinand opened the *third campaign* (1758) by driving the French from Lower Saxony, pursued them across the Rhine, and defeated them near Krefeld (June 23); but Contades, the new French commander, having obtained the co-operation of Soubise, compelled him to retrace his steps, till, receiving a reinforcement of 12,000 British, Ferdinand again advanced, throwing Contades between the Rhine and Meuse, and Soubise between the Rhine and Main. Meanwhile, Frederick had not been idle, for after being driven out of Moravia (which he had invaded in spring) by Daun, he marched northwards with a portion of his army to meet the Russians, who, the czarina having recovered, had again invaded Brandenburg, and defeated them in a desperate battle at Zorndorf (August 25), compelling them to retreat into Poland. Frederick's presence was next needed in Saxony, where his brother, Prince Henry, was being hard pressed by Daun with superior forces; but on his arrival the Austrians retreated eastward till October 14, when Daun turned, took Frederick completely by surprise, and gave him a severe defeat at Hochkirch (q. v.), though before the end of the year the Prussians were again in possession of Saxony. Thus passed another campaign with a slight advantage to the Prussians.—The *fourth campaign* (1759) (preceded by fruitless attempts at negotiation with France, on the part of Frederick), though signalised by only two great actions, was more unfortunate for Prussia. The French under Soubise had captured Frankfurt during the winter, and the Duke of Brunswick, in attempting to recover it, was defeated at Bergen (April 13), by Broglie (the successor of Soubise), and compelled to resign the whole of Hesse to the French; but later in the year, his signal victory at Minden (August 1) over Contades and Broglie, and that of his relative, the hereditary Prince of Brunswick, at Gohfeld on the same day, recovered most of Westphalia, and drove the southern French beyond the Lahn and Rhine. But in the Saxon district, although Prince Henry invaded Bohemia (April), capturing immense supplies, and cleared Franconia (May) of Austrians and Imperialists, he subsequently evacuated Saxony, which was then occupied by the Imperialists, and Loudon's Austrians advanced into Lusatia. In Silesia, Fouqué gallantly

kept the Austrians at bay; and Dohna continued to coop up the Swedes about Stralsund, keeping at the same time an eye on the Russians; but the latter soon gathered in such force that he was compelled to retreat. His successor, Wedel, in attempting to bar their advance, was routed near Züllichau (July 23), and though Frederick hastened to his assistance, attacked them at Kunersdorf (q. v.) (August 12), and had almost gained the day, the arrival of Marshal Loudon with an Austrian force turned the tide, and converted this almost victory into the most signal defeat suffered by the Prussians during the whole war. On the following morning, he could hardly muster 5000 men, but, luckily, the Russians shewed no inclination to follow up their victory, and by untiring perseverance, the Prussian monarch succeeded in raising another army 28,000 strong. Though it seemed almost impossible for him to prevent the meditated junction of the Russians and Austrians in Brandenburg; yet, by dint of skilful manœuvring, he succeeded in compelling the Russians to retire to Poland; and Prince Henry, by cutting off their supplies, forced the Austrians into Saxony. On November 21, however, he suffered a severe blow in the capture of Finck with 11,000 Prussians, at Maxen in Saxony. With greatly diminished strength, an exhausted treasury (chiefly supplied by the English subsidy, the taxes of Saxony, and forced contributions on Mecklenburg, Saxony, and Anhalt), a desolated territory incapable of affording either men or supplies, and gloomy forebodings of the final issue, though with unfaltering resolution never to yield, Frederick prepared for his *fifth campaign* (1760).—His army in Prussia, now reduced to 90,000 men, mostly foreigners and raw recruits, was still further diminished by the capture of Fouqué with 8000 men in Silesia, followed by Marshal Loudon's conquest of that province, though the brilliant victory of Liegnitz (August 15) subsequently restored him the north-western division of it; he then joined his brother, Prince Henry, drove the Russians across the Oder, and Daun into Bohemia; but his strength was now becoming glaringly insufficient for the task to which he had set himself; the Russians and Austrians captured and plundered Berlin (October 3); the Swedes came down from the north, and Loudon's [illegible] upwards through Silesia, so that he was now fairly in the toils. But, like a lion in the midst of the hunters, he turned upon his most able and pertinacious adversary, Daun, terribly routed him at Torgau (November 3), in Saxony, then drove Loudon into Glatz, and frightened away the Russians to Poland, and the Swedes to Stralsund. In the west, the fortune of Prussia was in the ascendant, and the French, defeated by Prince Charles of Brunswick at Einsdorf (July 13), and by Duke Ferdinand at Marburg (July 31), were again confined to Hesse.—The *sixth campaign* (1761) on the Rhine commenced still more auspiciously for Frederick, as the French were driven in detail from their strongholds, had their supplies captured, suffered defeat by the Hanoverians at Langensalza (February 14), and by Duke Ferdinand at Villingshausen (July 15), though in the end Broglie and Soubise again gained possession of Hesse. In Silesia, Frederick attempted to bar the progress of the Austrians, so as to prevent their junction with the Russians, and so opposing 130,000 men to his poor remnant of 50,000; but in vain; however, the union was productive of no ill results to him, for scarcity of provisions speedily compelled the Russians to retreat to Poland, after which Loudon retired to Upper Silesia, capturing Schweidnitz with 3700 men on his way. In Saxony, Prince Henry had to retreat before Daun, and the Prussians were ejected from Pomerania by the Russians and Swedes, all subsidies from Britain stopped by the Earl of Bute after George II.'s death, and the country ravaged in all directions, so that things were now in a desperate condition, and Prussia almost at its last gasp. Frederick's assailants had cooped him up within Southern Brandenburg and North-western Silesia, and though as resolute as ever to fight on, it seemed as if another campaign must bring him to final ruin. But the death of the czarina (January 5, 1762) converted the most powerful of his enemies into a fast friend; Sweden, which had suffered uninterrupted reverses during the whole war, also retired from the alliance—and the *seventh campaign* (1762) commenced on equal terms, as Austria and France were almost as much exhausted as Prussia. On the refusal of Austria to submit her cause to arbitration, the Czar Peter III. joined his army to that of Frederick; but his successor, Catharine II., ordered the return of the army, though her strict neutrality was of itself an immense benefit. Frederick had now no fears for the result. Nor had he any reason, as subsequent events shewed, for on July 21 he drove an Austrian force from its intrenchments at Burkersdorf, and following up his success, routed Daun at Reichenbach (August 16), and took Schweidnitz (October 9); while Prince Henry, by a series of fortunate manœuvres, possessed himself of the passes of the Erzgebirge, and with the valuable aid of Seidlitz, completely overthrew the other Austrian army at Freiberg (October 22); and the two Brunswicks nobly sustained the glory of Prussia at Wilhelmsthal (June 24) and Luternberg (July 23), capturing Cassel, and recovering the whole of Hesse. France now gave up a contest from which she had gathered nothing but military disgrace, and concluded treaties with Britain and Prussia; while Prussia and Austria agreed to an armistice with regard to Saxony and Silesia, of which the astute Frederick took advantage to send Kleist on a raid through Franconia and Bavaria, which had the effect of withdrawing the minor German states from the coalition. Maria Theresa was now left alone, and sorely against her will, was compelled to conclude the peace of Hubertsburg, 15th February 1763, which finally acknowledged Frederick as the lord of Silesia. This long and desperate conflict made no change in the territorial distribution of Europe, but it increased tenfold the moral power of Prussia, and gave its army a prestige which it retained till the battle of Jena. It cost Europe a million lives, and prostrated the strength of almost all the powers who had engaged in it.—See for a complete account, Carlyle's *History of Frederick the Great.*

SE'VERALLY, in English Law, is the enjoyment by an individual of an estate, in contradistinction to Joint (q. v.).

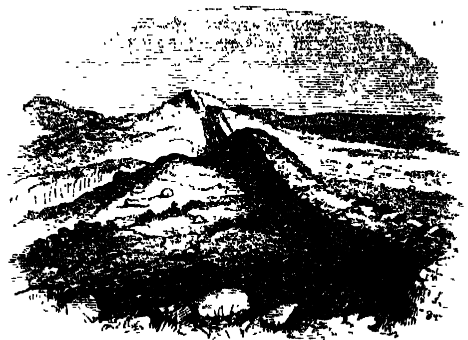
SE'VERN, one of the most important and beautiful, and after the Thames, the largest of the rivers of England, rises from a chalybeate spring on the eastern side of Plinlimmon, about 11 miles west of Llanidloes, in Montgomeryshire, North Wales. Flowing eastward from its source to Llanidloes, to which town it retains its original British name of Hafren, it afterwards flows north-east to the eastern boundary of Montgomeryshire, then east-south-east, past Bridgenorth in Salop, and finally southward through Worcester and Gloucester, in which last it begins to form its estuary. It is navigable for barges to Welshpool in Montgomeryshire, 180 miles from its mouth. Its entire length is 210 miles, and it drains an area of more than 8000 sq. miles. The chief affluents of the S. are the Terne, and the Upper and Lower Avon on the east, and the Teme

and Wye on the west. A canal 18½ miles long, and navigable for vessels of 350 tons, extends from Gloucester to the upper portion of the estuary of the river, and thus materially shortens the navigation of its lower course. The Montgomery Canal extends from Welshpool to Newton, and other canals establish communication between the S. and the Thames, Trent, Mersey, and the other important rivers of the middle districts of England. The *bore*, or tidal wave, which rushes up the S. with a velocity at times of 14 miles an hour, raises the water 9 feet in height at Gloucester, below which embankments have been constructed along the water-course to prevent inundation. See BRISTOL CHANNEL.

SEVERUS, ALEXANDER. See ALEXANDER SEVERUS.

SEVERUS, L. SEPTIMIUS, Roman emperor, was born 11th April 146 A.D., near Leptis Magna, on the north coast of Africa, of a family of equestrian rank; and after receiving an excellent education removed to Rome, where he became prætor, 178 A.D. He was subsequently commander of a legion in Gaul, and governor of Gallia Lugdunensis, Pannonia, and other provinces. After the murder of Pertinax, he was proclaimed emperor, 193 A.D., at Carnutum, and promptly marched upon Rome, where the puppet Julianus had by purchase obtained the imperial purple. His arrival before Rome was the death-signal for Julianus; and after taking vengeance on the murderers of Pertinax, converting his most formidable rival, Clodius Albinus, into an ally by creating him Cæsar, and distributing an extravagant largess to his soldiers, he marched against Pescennius Niger, and conquered him at Issus, 195 A.D. A glorious campaign in the East, and a three years' siege, followed by the capture of Byzantium, were followed by a desperate struggle with his jealous rival, Clodius Albinus, whom, after an obstinate conflict at Lyon, in which 150,000 were engaged on each side, he conquered, 197 A.D. The usual games to the degenerate citizens of Rome, and largesses to the troops, followed, after which S. returned to Asia, accompanied by his sons Caracalla and Geta, met with the most brilliant success in the campaign of 198 A.D. against the Parthians, and took and plundered their capital, Ctesiphon. After a war with the Arabs, in which S.'s usual good-fortune deserted him, and a general visit to his various eastern dominions, he returned to Rome, 202 A.D., and gratified the popular taste by the exhibition of shows of unparalleled magnificence, also distributing another extravagant largess to the citizens and prætorians. A rebellion in Britain drew him to that country in 208 A.D.; and at the head of an immense army, he marched, it is said, to the extreme north of the island, encountering enormous hardships, to which no less than 50,000 of his soldiers succumbed, and securing no permanent advantages. To secure to some extent the natives of South Britain from the incursions of the Meatæ and Caledonians, S. commenced the wall which bears his name, and died soon after at York, 4th February 211 A.D. S. was an able, vigorous, and just ruler, and a skilful warrior, but totally devoid of high moral sentiment, a deficiency especially observable in cases where his own interests were involved.

SEVERUS, WALL OF, a rampart of stone built by the Roman Emperor Severus in Britain, 208 A.D., between the Tyne and the Solway. On the first subjugation of Britain by the Romans, a line of forts had been constructed by Agricola, extending from the Forth at Edinburgh to the Clyde at Dumbarton. The Emperor Hadrian, on visiting Britain, 120 A.D., threw up for the protection of the Roman province a wall of turf extending across the narrowest part of the island, between Tyne and Solway. Twenty years later, Antoninus Pius, whose lieutenant, Lollius Urbicus, had gained fresh advantages over the northern tribes, endeavoured to check the inroads of the Caledonians by erecting another rampart of earth between the Forth and Clyde, connecting Agricola's line of forts. But after a vain struggle of 60 years, the Romans found it necessary to abandon the whole district between the walls, and Septimius Severus built a rampart of stone



A Portion of the Wall of Severus, near Housestead, Northumberland.

immediately to the north of the wall of Hadrian. Towards the close of the 4th c., Theodosius, for a brief period, reasserted the Roman dominion over the district between the walls of Antonine and Severus, which, in honour of the Emperor Valens, obtained the name of Valentia. But this newly-established province was soon lost, and it was not long before the Romans finally abandoned Britain. Many remains of the Roman walls are yet to be traced.

SEVIGNÉ, MADAME DE, MARIE DE RABUTIN-CHANTAL, was born at Paris, 6th February 1626. She was the only daughter of the Baron de Chantal, Celse-Benigne de Rabutin, and his wife, Marie de Coulange. She was left early an orphan; and at the age of six the care of her education devolved on her maternal uncle, the Abbé de Coulange, an excellent and amiable man, who most conscientiously acquitted himself of his charge, and for whom through life his niece entertained the tenderest affection. She was carefully instructed in all the knowledge which then appertained to the education of a French gentlewoman; by the eminent scholar Menage she was taught Latin, Italian, and Spanish; and M. Chapelain, another literary notability of the time, also assisted in her culture. At the age of 18 (Aug. 1, 1644), she was married to the Marquis Henri de Sevigné, the representative of an ancient House in Brittany. The union was not a happy one. The marquis was 'a man of wit and pleasure,' of the type of the period; his wit he exhibited by his happy way of squandering his wife's fortune, and he took his pleasure in neglect of her, and addiction to other women. After a time, he was killed in a duel (5th February 1651), by a certain Chevalier d'Albret, his rival in a love-affair. Left with a son and daughter, S. now for a few years retired almost wholly from society, and devoted herself to their education. In 1654, she returned to Paris, where her beauty, her wit, her happy social tact and vivacity, concurred, with the charm of her sweet and kindly nature, to insure her unrivalled success in the brilliant society of the period. Her lovers were legion, and among them were numbered some

of the most distinguished men of whom France could then boast, as the Prince de Conti, Turenne, Fouquet the Superintendent of Finance, and others. But they sighed in vain: all offers of marriage she steadily declined; and from any of those lighter ties, there and then most leniently looked on—if not almost considered *comme il faut*—she has left no spot upon her reputation. For her virtue she must have credit as virtue, and not merely the coldness which simulates it; for she was obviously of a warm, eager, even somewhat impulsive nature. Her numerous and warm friendships, with her absolute devotion to her children, may have sufficed as food of a heart not unlikely, in lack of these, to have craved a more perilous diet. Her affection for her daughter in particular, who in 1669 became Madame de Grignan, was the ruling passion of her life; and to the separation of the mother, over long periods, from 'this infinitely dear child,' the world is indebted for by much the larger moiety of the collection of Letters which has given fame in perpetuity to Madame de Sevigné. Madame de Grignan was one of the most beautiful and accomplished women of her time, and every way worthy of the love thus lavished without stint upon her. If she did not reciprocate its full fervour, *that*, as the shrewd mother well knew, was simply in the nature of the case; and not to have demonstrated in return more rapture than she really felt, ought to count as a point in her favour, rather than reverse-wise as it has been held to do. If it was the one main grief of Madame de S. to be forced to live apart from her daughter, the happiness of dying beside her, may perhaps have a little consoled her for it. In 1696, while on a visit to the Château de Grignan, she was seized with malignant small-pox, and died at the age of 70.

The Letters of Madame de S., on which her fame securely rests, are charming in the *abandon* and easy *naïve* frankness with which they reveal her beautiful nature. They sparkle with French *esprit*, and spontaneous gaiety of heart; and their writer is scarce anywhere quite equalled in the delicate *finesse* with which, in a few careless rapid words, she flings off a scrap of light narrative, dashes in a little graceful picture, or points a dramatic situation. Above all remarkable is the lightly-moved and ever active sympathy which keeps her exquisitely *en rapport* with the interest of whatever may be passing before her.

SEVILLE (Span. *Sevilla*, the *Hispalis* of the Romans), a famous city of Spain, formerly capital of the ancient kingdom, and now of the modern province of the same name, stands on the left bank of the Guadalquivir, 94 miles by railway north-north-east of Cadiz. The city is almost circular in shape, is surrounded by Moorish walls, surmounted with 66 (formerly 166) towers, and pierced with 15 gates, and is 5 miles, or, including its 10 suburbs, 10 miles in circumference. Held by the Moors for five centuries, and entirely rebuilt by them from the materials of former Roman edifices, S. was long a purely Moorish city, and the old Moorish houses, which age, in this dry climate, has done little to destroy, are still the best houses to be seen. Half of the city still preserves its ancient character; but changes are taking place every year. The narrow tortuous streets that kept out the sun, with their wide spacious mansions, with ample courts and gardens, so perfectly suited to the climate, are giving way to spacious straight streets of small, hot houses, open to the blaze of noon. The cathedral, one of the largest and finest in Spain, is an imposing edifice, of which the solemn and grandiose are the distinctive qualities. It was completed in 1519, is 431 feet long, 315 feet wide, has 7 aisles, and an organ with 5400 pipes. The pavement is in black and white checkered marble. The cathedral is superbly decorated. Its painted windows are among the finest in Spain, and it contains paintings by Murillo, Vargas, the Herreras, &c. Attached to the cathedral is one of the most remarkable towers in the world. It is called the Giralda (i. e., a weather-cock in the form of a statue), and is in all 350 feet high. This Moorish tower was built in 1196, and was originally only 250 feet high, the additional 100 feet being the rich filigree belfry added in 1568. The pinnacle is crowned by a female figure in bronze, 14 feet high, and 2800 lbs. in weight, and which veers about with the slightest breeze. From this great tower the *Mueddin* (q. v.) of Mohammedan days called the faithful to prayers. The royal residence, the Alcazar (*Al-Kasr*, house of Cæsar), contains several noble halls, and much delicate ornamentation, that rivals that of the Alhambra. The house in which Murillo lived and died is still to be seen here. The finest pictures in S. are to be seen in the cathedral, the Caridad, the Museo, and the University. S. contains 74 churches; but prior to the suppression of monasteries, it contained 140. Besides the university (of four faculties), there are many educational institutions. The city contains upwards of 100 squares. The Fabrica de Tobacos, where tobacco is made into snuff and cigars, employs 4500 hands, principally females. The Plaza de Toros can accommodate upwards of 12,000 spectators. There is regular communication with Cadiz by river and rail. There are here several royal foundries and factories for arms, and porcelain and iron and machine works. Weaving, soap-making, and other branches of manufacture are carried on. Pop. 152,000.

The Hispal of the Phœnicians, the Hispalis of the Romans, was corrupted by the Moors into Ishbilliah, of which it is supposed the modern name is a modification. It was a place of great importance in the later period of Roman dominion; became the capital of Southern Spain during the ascendency of the Vandals and the Goths, when it was the scene of two notable church councils (590 A.D. and 619 A.D.); and fell into the hands of the Moors in the 8th c., under whom it rapidly rose to a splendid prosperity, and reckoned 400,000 inhabitants. In 1026, it became the capital of the Moorish kingdom ruled by the Abadides, from whom it passed, in 1091, to the Almoravides, and in 1147, to the Almohades. In 1248, it was taken by Ferdinand III. of Castile, when 300,000 Moors left for Grenada and Africa; and from this time to the removal of the court to Valladolid, in the reign of Charles V., S. was the capital of Spain. The city rose to its climax of prosperity after the discovery of the New World, when it became the residence of princely merchants, and the mart of the colonies, but its trade was afterwards transferred to Cadiz. In 1810, it was taken and ravaged by Soult. It capitulated to Espartero in 1843.

SÈVRES, a small town of France, in the dep. of Seine-et-Oise, six miles south-west of Paris, on the Paris and Versailles Railway. It is celebrated for its manufacture of porcelain wares, which gives active employment to 150 persons. S. wares are unsurpassed for elegance of design and beauty of painting. Painted glass is also manufactured. The Porcelain Museum contains a large and curious collection of articles in china and earthenware from all parts of the globe. Pop. (1862) 6184.

SÈVRES, DEUX-, an inland dep. in the west of France, between the deps. Vienne on the east and Vendée on the west. Area 2315 sq. m.; pop. (1862) 328,817. The dep. takes its name from two

rivers of the same name, the Sèvre-Niortaise, which flows west into the sea, and the Sèvre-Nantaise, an affluent of the Loire. It is traversed from south-east to north-west by a chain of hills, called in the south-east the Monts du Poitou, and in the north, the Plateau de Gatine. This ridge forms the watershed between the Loire on the north and the Charente on the south. The climate is generally healthy, and the soil, two-thirds of which is arable, is very fertile. There are numerous iron mines, and good quarries of freestone and marble. The arrondissements are Niort, Bressuire, Melle, and Parthenay. Niort is the capital.

SEWAGE. It is of the first importance to health for houses, both in the town and in the country, that all filth should be removed from them as speedily as possible, and disposed of in such a manner as to cease to be injurious to mankind. It may be taken as a pretty safe general guide, that all matters which give off a disagreeable smell are dangerous if allowed to remain near our dwellings; nature thus giving us warning of the presence of something that may do us harm. Many people have thought that if, by using certain deodorising materials, they could either fix this effluvium permanently or for a time, they had surmounted the difficulty; but this is scarcely half a cure, and a palliative like this is much less advisable than a radical measure of removing the filth by suspension in water, and rendering of it not only innocuous, but beneficial, by incorporating it with the great natural deodoriser—the earth. It seems as if nature had planned all this for us, if we will only follow her teaching. During the first two or three days after sewage is deposited in water, the smell is unpleasant, but not dangerous to mankind; after that, putrefaction begins, and the gases given off become deleterious. Here, then, is time for removal, and a punishment for neglect. Fevers, gangrene, ophthalmia, and many other diseases, especially among children, are certain to break out and become malignant if the emanations from such filth exist in the air around human habitations. Until within the last 50 years, privy-pits and cesspools prevailed everywhere. In the country, the former were generally placed in the garden attached to the house, and at some distance off, so that there was not much danger attached to them. In the towns, cesspools existed among the houses, but they were very objectionable and dangerous, and constantly neglected. These cesspools were large underground tanks built in brickwork, into which all the sewage from the house was discharged. In them the filth accumulated and putrified until it was periodically removed by manual labour. They acted like an immense brewing vessel, sending up deadly vapours which had no escape, except back into the house among the inhabitants. The cesspools also frequently leaked, and so if any wells were near, poisoned the water. When Bramah invented the water-closet, and a larger supply of water had to be found for towns, the cesspools began to overflow at such a rate, that a general revision of the whole system became necessary; and at the same time, medical men insisted upon the continuous and perfect removal of filth as the only reliable sanitary process of dealing with the matter. A return to the use of cesspools in any form would therefore be a step in the wrong direction, and would lead to disastrous results.

We may divide the subject as follows: 1. The Management of the Sewage of Cottages; 2. Dwelling-houses and Public Buildings in the Country; 3. Towns; and 4. The Utilisation of Sewage.

1. *Cottages.*—It is obvious that in the case of single detached cottages, expensive arrangements such as those necessary for water-closets could not be provided, and some simpler plan must be followed.

It is very objectionable to allow either cesspool or privy-pit, if they can be avoided, as they are constantly neglected, and overflow into some stream, or poison the wells and the air. The privy should be placed, wherever that can be managed, on the north or east side, and to the rear of the house, so as not to be between the people and the sun and softest winds. The whole sewage-matter should be received in a square galvanised iron pail underneath a seat, which pail can be removed from the outside, and into which a small quantity of house-ashes should be placed, either daily, or as often as the closet is used. This will quite fix the ammonia. The iron pail must be removed by the cottagers at least once a week, and emptied into their garden. No danger can possibly arise from this, if strictly followed, and all the sewage-matter is placed to its best purpose. The sketch attached (see fig. 1) will

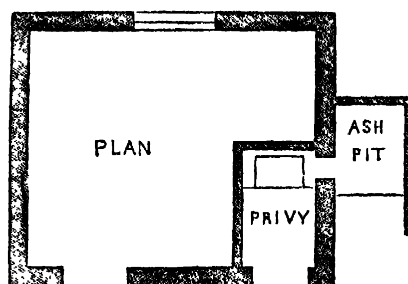


Fig. 1.

shew the way of doing this. There has not been found any difficulty in introducing this system among cottagers.

2. *Dwelling-houses and Public Buildings in the Country.*—It would be useless to discuss a dry-earth system like what has been mentioned anywhere but for outhouses attached to cottages; the general feelings of the inhabitants would not tolerate it. We must therefore accept the water-closet as the system universally adopted. In planning the position of water-closets for a house, the first thing to be thought of is, that they shall be if possible on the north or cool side of the house, and upon exterior walls. If they are placed in the interior of the house, it is troublesome to get at the drains when required, and the closets themselves cannot be sufficiently ventilated. If the closet is inside the house, then Bramah's patent with a D trap underneath is the only form that should be used; but if the closet is outside, then a less expensive one with a syphon earthenware trap may be adopted. It is desirable that the closet should be surrounded with brick walls, and, in fact, isolated from all other parts of the house. The window of the closet when inside the house should always reach the ceiling; and a ventilating shaft in the manner shewn in the accompanying sketch is desirable where the closet is much used, and the window must be shut occasionally. The ordinary water that passes into the drains leading from any closet—such as is discharged each time that the handle is raised—is not sufficient to sweep out thoroughly all the solid matter from the drain-pipes, and therefore a flushing apparatus at the highest point of all sets of drains is essential, so that a body of water may be allowed to pass down with a rush at least twice or three times a week. It is also desirable that the foul air engendered in the drain-pipes themselves should have

some free outlet into the air at some point where it will not be injurious. The gas given off under such circumstances is of a very light character, and has a great tendency to ascend and draw towards heat. During the greater part of the year, especially since the system has been introduced of heating houses by hot air, the temperature of living-rooms is much higher than the atmosphere outside; a pumping action is exercised upon the drains, or indeed upon any outlet, for a fresh supply. If, therefore, some safety-valve is not provided, the gas will force an entry either through the traps or some imperfection in the joints of the drains. The sketch, Fig. 3, will shew the best plan that has yet been devised both for flushing and ventilating the soil-pipes of water-closets. In constructing the drains from houses or large public buildings, it is now a well-decided point that there should be an entirely separate system for the sewage or foul water, apart from that for rain and surface-water. The reasons are many and obvious, but they will be given more appropriately under the head of the Drainage of Towns. Stoneware pipes are the best material to be used for drains, because they are perfectly non-absorbent; but in many cases glazed earthenware will answer very well. The smallest size of pipes of any description that should be used for removing sewage from a house is six inches in diameter. This size, then, may be gradually increased as is necessary, and one of 9 inches will remove the sewage of 500 people. The best fall to be given to a sewage-drain is 1 inch in 10 feet; but all will work well from 1 inch in 5 feet up to 1 inch in 60—provided the flushing arrangements are as they ought to be. In order to keep the drains clean, there must not under 10 gallons of water daily pass down the drain for every person in the house; while anything over 25 gallons is superfluous. At every 20 yards there should be a pipe laid from which the upper half can be removed, and the interior inspected at any time, and any stoppage remedied without the necessity of breaking the pipes. Greasy water, such as is poured down from the kitchen and scullery of a house, is one of the constant causes of such stoppages. The fat, as it cools, congeals on the sides of the pipes, and forms a hard cake. The best method of preventing this is to form a small cesspool, into which the kitchen water is poured first, and then to take an overflow through a syphon into the foul drain, so that the liquid only enters, while the fat can be

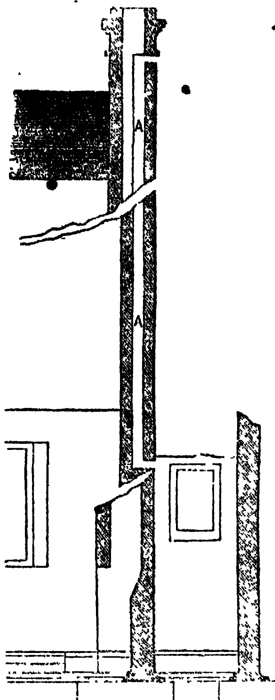


Fig. 2.

AA is the ventilating shaft by which any foul air in the closet itself can pass upwards into the open air. By placing it alongside of a chimney a draught is created which will empty the closet of any effluvium that may be in it.

removed by hand from the cesspool. The sewage-matter having been thus all thoroughly removed from the house, a sewage-filter should be built on

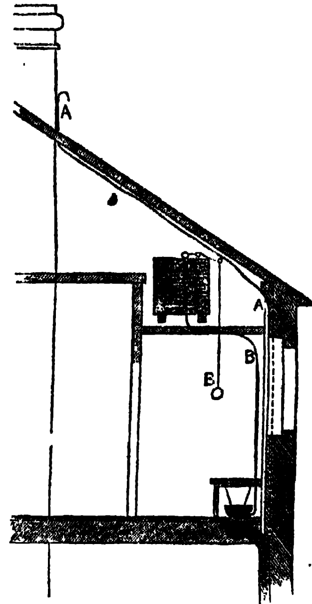


Fig. 3.

AA is the ventilating pipe communicating with the soil-pipe; BB is the flushing apparatus for discharging a quantity of water at once.

the principle shewn in the sketch, Fig. 4. This was originally the design of the Prince Consort. The solid and liquid matters of the sewage are here mechanically separated, and the former can be removed from time to time—say once in six weeks or two months—while the latter must be passed on for irrigation. It is clearly illegal to pass it into

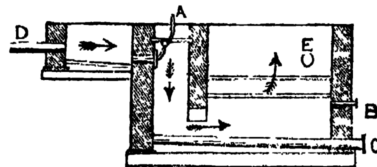


Fig. 4.

The whole sewage matter enters at D; flows in the direction of the arrows; the solid matter becomes arrested in the bottom chamber, while the liquid rises and passes off at E through filtering beds. By opening a tap at B the liquid in the tank or filter can be drawn off, and by opening that at C, the solid matter can be removed. The whole must be water-tight and air-tight. A is a valve for shutting the pipe during cleaning.

any stream; and it is apt to become a serious nuisance if anything else is done with it. We shall treat of the best method of utilising this liquid under the fourth head. It is always advisable to get space for all these arrangements on the north and east side of a house, when possible, so as to run no risk of contaminating the air on the south or hot side of a dwelling; and if a belt of trees can be placed between the sewage-filter and the irrigated land and the house, it will also be advantageous.

3. *The Drainage of Towns.*—Until within the last 30 years, the only drainage which existed in towns was for the rain-water and surface-water

alone, and the inhabitants were strictly watched to prevent their passing any sewage-matter into these drains. The introduction of the water-closet, however, gradually increased the water which overflowed from the old cesspools to such an extent that it was impossible to prevent overflows of this description, and systems of drainage were designed to carry off the whole, both sewage and rain-water. A very composite system of drainage then arose. Generally, the bed of some stream or natural rivulet passing through the town was covered over, and the whole filth passed into that along with the rainfall of the district. This soon was found unsatisfactory, because the flood-waters of the stream were not to be relied on to keep the channel clean, and so the filth remained festering underneath the ground, giving off deadly gases in the midst of the population. The next arrangement which succeeded to that system was to plan large drains for the rain and surface-water, and sewage, and still keeping the idea of the size of the bed of a natural stream before them, engineers thought it necessary to make all the main drains large enough for a man to pass through them, and keep them clean. Seeing the vast quantity of sand and grit that was occasionally washed off the streets, something might be said in defence of this system. Vast numbers of these great main sewers still exist. Into these sewers all the smaller house-drains were to enter, and the surface-water through street-gratings as well. The ordinary water used for domestic purposes, and the occasional rainfalls, were relied upon to flush those large main sewers; but their great size made this an exceedingly difficult and uncertain process, and they, in fact, became only cesspools elongated. In dry weather, the filth was retained in them to such an extent, that after heavy rains, chemical analysis shewed that the water which was discharged contained frequently twenty times the amount of human faecal matter per gallon more than it did in dry weather. This state of matters, added to the fact that long-continued dry weather was always attended by an increase of deaths from typhus and other fevers, clearly shewed that something more must be done. A further step was then taken by sanitary engineers. The idea of men passing up the drains was set aside, and the smallest possible drains were constructed, until these have arrived at such dimensions as an 18 inch main drain for a town of 10,000 inhabitants. The rainfall was still to be relied on to a certain extent for flushing purposes, but a supplementary assistance was to be given at some points by flushing with water from the ordinary regular supply of the town. As these smaller drains were not sufficient to carry off all the surface and rain-water, as well as the sewage, overflow weirs have been provided at certain points, where the excess must go over, and pass away into some other channel. This is the system now most generally adopted, and is better than its predecessors; but we believe that it, in its turn, must give way to something better, and that before many years. The necessity of dealing with the sewage at the main outfall, and the utilisation of it for agricultural fertilisation, while, in nine cases out of ten, pumping must be employed to lift the sewage of a town at the discharging point for such a purpose, have gradually forced upon us the conviction that the sewage and household water must be kept quite distinct from the surface-water and rainfall.

The outfall of the sewage drain, and subsequent disposal of the filth, are in reality the first things to be considered. Hitherto, engineers in general have taken the nearest stream, and polluted it to such an extent, that perpetual lawsuits, nuisances, and diseases have been the result. Fever of the worst class is certain to follow the drinking of water tainted in this manner, and there is scarcely a stream in the interior of the country which has not been injured more or less from this cause.

Again, where the sewage has been emptied into the sea, tide-locked drains are objectionable, and the sewage, when mixed with salt water, generally gives off more stench than ever. We may briefly say that all attempts at deodorisation by chemical processes have hitherto failed, and as far as our present knowledge goes, are not to be relied upon. The utilisation of the sewage on the fields by irrigation is, therefore, the true solution of the problem, and we must arrive at the simplest, cheapest, most certain, and most perfect system of accomplishing this. When sewage and rainfall all go together in the same drains, as they do in all the older systems, all is uncertainty; while, were the two separated, rain and surface-water can be discharged at any point into the natural water-courses of the country, and a fixed quantity of sewage, with household and flushing water, would be passed to the main outlet, to be there dealt with. The opponents of this system say that it is too expensive and troublesome to plan; that it is unnecessary, as it is sufficient if engineers provide for the dry-weather flow of the sewage, and use that for irrigation; and that when the overflows come into action in floods, the whole is so much diluted, that no harm is done to any one. The advocates of this double system of drainage say that the total separation of the two is the most sanitary system, because the street-gratings and rain-water pipes, which at present let down the rain-water into the sewage-drains, act, in fact, as so many ventilating shafts, and discharge the stench in the midst of the inhabitants; while, under a separate system, the sewage-pipe would be entirely sealed up, and only ventilated at such places as could safely be done; that the rain-water as a flushing-power ought to be entirely discarded, as it fails in dry weather, just when it is most wanted; that in wet weather, and winter again, when the discharging of the sewage on to the surface of land is carried out, the great quantity of water sent down through the drains by the present system is agriculturally a serious injury; that when pumping has to be employed for lifting the liquid for irrigation, as it is in most cases, all is uncertainty, and that no machinery can be economical and efficient under such circumstances, and that the planning of the irrigation also becomes difficult to manage, and irregular. With regard to the expense, it is further maintained that, as the rain-water and surface-water can be discharged at the nearest point, all the drains may be much lessened in size; and further, that the flushing-power of the water in the sewage-drains will be much more efficient, while the corresponding lessening of the expense in carrying out the process of utilisation will completely compensate any additional outlay that may be incurred in laying the drains in towns. If we take the case, which is a common one, of a population of 10,000 people living upon a square mile, the first-mentioned system, where rain and sewage water go together, would require pumping-machinery, in dry weather, of, say, five horse-power, to lift the liquid; and it would further be necessary, for wet weather, to have in reserve a lifting-power of 150 horses; while, on the separate system, where the sewage alone would have to be dealt with, the five horse-power engine would be regularly and constantly employed, and its work would be almost entirely confined to the daytime, whereas the other must be ready at any time, and

for every emergency. The system of sending sewage and rain-water together has been hitherto adopted in all towns; but except in one or two cases where gravitation has been available to utilise the discharge from the drainage, all engineers have failed to prevent the pollution of rivers, and it is obvious that something else must be tried, as that cannot be permitted to go on much longer. The system of separating the sewage and rain-water has been carried out in several large asylums and public buildings, with their attendant houses, and the sanitary results have been thoroughly satisfactory; while the utilisation has been, in consequence, completely carried out, and is manageable at all seasons and in all weathers. Within two or three years, it will also be accomplished in some towns, and the public can then judge between the two.

4. *The Utilisation of Sewage.*—The whole of the sewage of a house or town having been conveyed away in the manner we have described, the next important step is to know what to do with it. Above all things, it is desirable to add to the productiveness of the soil, so as to compensate in some degree for the constant supply we are drawing from that source.

The liquid nature of sewage, adopting as we may the ordinary amount of dilution in dry weather at the rate of 25 gallons per head, has been a great obstacle in the way; while also the vast quantities of road-grit, and the great gluts of rain that come down along with the sewage when there is only one system of drains in a town, have upset all arrangements and calculations. Many attempts have been made, especially at Leicester, some years ago, to precipitate all the valuable qualities of the sewage by impregnating the whole with milk of lime; but the process was unremunerative to those who did it, as so much sand was precipitated at the same time, that the product obtained was almost worthless as a manure; while, as the greater part of the ammonia escaped in the water, the discharging of it into any stream was still, strictly speaking, quite illegal. As far as chemical knowledge can guide us, there seems at present to be no hope in this direction.

At Edinburgh, again, and at Croydon, the irrigation of land by gravitation has rendered the process a simple one, because the whole has been poured over the land with many excellent results. These, however, are clearly exceptional cases, and we must look to pumping as being necessary in by far the greater proportion of towns; while for the two places we have mentioned, the results would, in all probability, have been better still if the strength of the sewage had been more concentrated. Agriculturally speaking, any dilution above 25 gallons per head of the population is not desirable, but is injurious and expensive to distribute; while, again, human fæcal matter is too strong to be applied to land unless diluted in something like ten gallons of water. The Chinese teach us an important lesson in this respect. They place all the solid matter, when they remove it from the towns, in small wells in their fields, and then take a scoopful and mix it in about ten or twelve times its volume of water before they apply it to their crops. If any one attempts utilising sewage when mixed with rain-water, and has to pump the whole all the year through, he will find himself in endless difficulties.

Presuming, then, that we can arrive at a fixed quantity of 20 gallons per head of the population, or what may be taken as the dry-weather flow of the drainage from a town, the first step is to pass the whole through an upward filter, so that all materials may be intercepted which will be likely to interfere with the pumping, or choke the smaller pipes used for irrigation. This is necessary, also, because in its unfiltered state we cannot depend upon sewage going down and up again, and so passing over a valley, and the sphere of operations then becomes more limited.

Great part of the solid matter can also be removed by this process, and common house-ashes are the best mixing and deodorising material to facilitate the stuff being carried away.

A piece of land should then be sought out, with a slope, if possible, of one foot in 30 at least, and the filtered liquid, which will be full of strength, conveyed either by pumping or gravitation to the highest point of that land. Iron pipes should not be used, if possible; but when the land to be irrigated is very flat, they must be. From the highest point of the land selected, the liquid must be conducted by open channels or through common drain-pipes laid on to the surface to all the different points where it is wished, and utilised for irrigation. The land adopted should be moderately porous, and then for every 100 people an acre may be allowed, but this varies much according to the nature of the soil. The land must be thoroughly drained and prepared. The best crops to be grown are Italian rye-grass, with alternately crops of vegetables, such as potatoes, cabbages, rhubarb, mangold. All these will luxuriate on the liquid, and we think we may safely say that the command of such liquid would be worth to any person from £5 to £10 an imperial acre, according to local circumstances.

Milch cows thrive remarkably well on this grass, and it has been proved by chemical analysis that the milk is of the best quality, while the vegetables are also peculiarly wholesome.

Could such a system be carried out in the neighbourhood of all our large towns, the results would be highly beneficial. The difficulties in the way, principally arising from ignorance on the subject, have been great; but to this system, or something like it, there can be no doubt, before many years, we must come, to prevent pollution of the rivers, and to make the most of the sources of fertility which are at our command, but which we are at present recklessly wasting. Many committees have been appointed by the House of Commons to inquire and take evidence on this subject. In 1857, a commission was issued by the Crown to certain gentlemen, at the head of whom was Lord Essex, to inquire into 'the best mode of distributing the sewage of towns, and applying it to beneficial and profitable uses.' This commission went to work principally at Rugby, and have made a vast number of experiments, the general result of which may be stated to be, that ordinarily diluted sewage may be said to produce such increased crops as to warrant an agriculturist in giving one halfpenny a ton for it, a ton of water containing 224 gallons. The third Report was issued in April 1865, and the following recommendations are given as the results of their labour:

'1. The right way to dispose of town-sewage is to apply it continuously to land, and it is only by such application that the pollution of rivers can be avoided.'

'2. The financial results of a continuous application of sewage to land differ under different local circumstances; first, because in some places irrigation can be effected by gravity, while in other places more or less pumping must be employed; secondly, because heavy soils (which in given localities may alone be available for the purpose) are less fit than light soils for continuous irrigation by sewage.

'3. Where local circumstances are favourable, and

undue expenditure is avoided, towns may derive profit, more or less considerable, from applying their sewage in agriculture. Under opposite circumstances, there may not be a balance of profit; but even in such cases a rate in aid, required to cover any loss, needs not be of large amount. Finally, on the basis of the above conclusions, we further beg leave to express to your Lordships that, in our judgment, the following two principles are established for legislative application: First, that wherever rivers are polluted by a discharge of town-sewage into them, the towns may reasonably be required to desist from causing that public nuisance. Second, that where town-populations are injured or endangered in health by a retention of cesspool-matter among them, the towns may reasonably be required to provide a system of sewers for its removal; and should the law as it stands be found insufficient to enable towns to take land for sewage-application, it would, in our opinion, be expedient that the legislature should give them powers for that purpose.'

It is obvious, however, to any one perusing the above paragraphs, that they are exceedingly vague, and form but little guide to any one who must go into the question of whether money invested in utilisation of sewage-schemes will pay an adequate return upon the outlay. The uncertainty attending the dilution of the sewage; the necessity of maki. g the earth take it at all seasons; the distance that the liquid has to be pumped—have all been such difficulties in the way, that the commission could not well arrive at any other result than they have done.

The presumption would therefore seem to be a very strong one, that, until we arrive at fixed quantities, no reliable principles can be laid down that would in all cases enable us to overcome the difficulties attending the sanitary management and utilisation of sewage.

SEWARD, WILLIAM HENRY, American statesman, was born at Florida, New York, May 16, 1801, of Welsh and Irish descent. His father was a physician and merchant, who, after accumulating a moderate fortune, was appointed judge of one of the inferior courts. S. entered Union College at 15; in 1819, he visited the south, and was engaged for six months as a school teacher in Georgia. Called to the bar in 1822, he settled at Auburn, Western New York, and became the partner and son-in-law of Judge Miller. In 1825, his political abilities were manifested in an oration delivered at Syracuse, and in 1828 he was chosen president of a state convention. At this period, New York was the centre of a wide-spread excitement against Freemasons, and S., as a leading anti-mason, was elected to the state senate. In 1833, he visited Europe, and wrote a series of letters, which were published in the *Albany Evening Journal*. In 1834, he was a candidate for the office of governor of New York, but was defeated by the democratic candidate. About this time he received the lucrative appointment of agent of the Holland Land Company, which gave him wealth and influence. In 1838, he was elected governor of New York. In this position, he recommended the increase of education, internal improvements, a liberal policy toward foreign immigrants, and took the side of abolition in the growing controversies on slavery. In 1849, he was elected to the senate of the United States, where he became the acknowledged leader of his party, and in the debate on the admission of California he promulgated what was called his 'higher-law' doctrine, in saying that there was 'a higher law than the Constitution which regulated the authority of Congress over the national domain—the law of God, and the interests of humanity.' In a speech at Rochester, N. Y., in 1858, he declared that there was 'an irrepressible conflict between opposing and enduring forces,' and that 'the United States must become either entirely slave or entirely free.' In 1859, he revisited Europe, and extended his tour to Egypt and the Holy Land, and in 1860 was the most prominent candidate of the republican party for nomination for the presidency, but personal and local interests finally secured the election of Abraham Lincoln, while Mr S. accepted the important post of Secretary of State, in which he guided the diplomacy of the Federal government through the perils of the War of Secession with an almost unparalleled industry, energy, and success. On the 14th of April 1865, as the war approached its termination, and while S. was confined to his room by a fall from his carriage, President Lincoln was assassinated by John Wilkes Booth, an actor, at a theatre in Washington. At the same time, another assassin, named Paine, penetrated to the room of Mr S., dangerously wounded his son, and with a poignard inflicted wounds upon him which were at first believed to be fatal, but from which he slowly recovered. His works, consisting mostly of speeches and orations, have been published in four volumes octavo (New York, 1853—1861). He has also written a life of John Quincy Adams, and one of De Witt Clinton. S. is universally admitted to be one of the ablest and most accomplished of living American statesmen; but European critics are disposed to regard him as a type of the vices as well as the virtues of the national character; and while they respect him for the courage, fortitude, and resolute bearing he has ever shewn in adversity, they accuse him of displaying scant courtesy and something like arrogance in his intercourse with foreign governments.

SEWING-MACHINE, one of the most important inventions of this century. Like the stocking-frame, which in principle it closely resembles, we owe it to the ingenuity of a poor mechanic, striving to lessen the labour which he saw was a real hardship upon his wife and other poor women. Elias Howe, a native of Massachusetts, surrounded by a young family, for whom he was obliged to labour during the day, devoted his after-hours to the construction of a sewing-machine. This was about the year 1841, and his career since that period up to the present time forms a striking chapter in the annals of intelligent labour, and furnishes another proof of the saying that 'fact is stranger than fiction.' After incessant labour, during the latter part of which he and his family were indebted to a friend for the means of subsistence, he completed the first working sewing-machine, the patent for which was granted to him in May 1841. He did not succeed in inducing the people of his own country to see the value of his patent, and came to England, where, after patenting it here also, he met with so much discouragement that he sold the patent for £250 and a royalty of £3 per machine to a staymaker, Mr Thomas of Cheapside, London, who used it successfully in his own business, but did so little towards making it public that for several years its existence was only known to a very few individual manufacturers. When Howe reached his own country again, he found his American patent pirated by a wealthy company; but with admirable spirit he asserted his rights, and succeeded in establishing them; and it is gratifying to know that his talent, industry, and perseverance have been rewarded, for he is now a wealthy man. Howe's machine worked what is called the lock-stitch, but since his invention became known, several improvements and modifications have been introduced by

other inventors. The principal of these are as follows: 1. *Machines which sew with one thread;* of which one kind makes the *through-and-through*

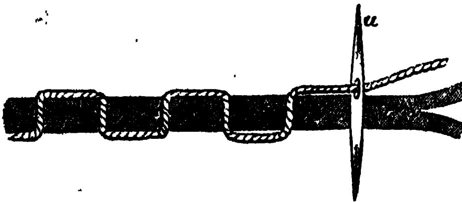


Fig. 1.

or *shoemaker's stitch* (fig. 1), the thread being held and pushed through with pincers, one pair on each side of the material to be sewn. The needle, *a*, is pointed at each end, and being pushed through by the pincers on one side, is taken hold of by the corresponding pair on the other, and the thread is thus pulled through backwards and forwards. Only a small length of thread can be used by this machine, hence it is of but limited application. 2. Another single-thread machine makes the *running-stitch* (fig. 2). In this, the needle, *a*, is stationary,

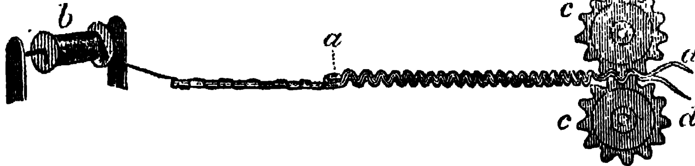


Fig. 2.

and receives a continuous supply of thread from a reel, *b;* the two small-toothed wheels, *c, c*, are so arranged that their teeth, pressing into one another, crimp the two pieces of cloth, *d, d*, and push them



Fig. 3.

forward against the point of the needle, which, as it gets filled, is relieved by the operator, who keeps drawing the sewn cloth off at the eye-end

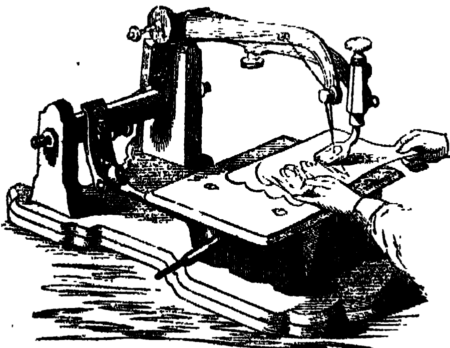


Fig. 4.

of the needle. This machine answers admirably in cases where loose tacking is required. It is the invention of an American of the name of Bostwick, who introduced it into England in 1844. 3. The *chain* or *tambour stitch* is also a single-thread stitch (fig. 3), the machine for which was invented by M. Thimmonier, a Frenchman, in 1848. In this, the thread is looped upon itself by means of a

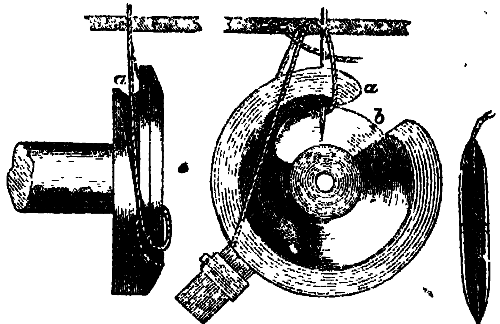


Fig. 7. Fig. 5. Fig. 6.

curved shuttle after it has passed through the cloth This kind of stitch, though very useful for some kinds of work, is easily pulled out. 4. Fig. 4 represents Wheeler and Wilson's sewing-machine, another American invention, which has acquired the greatest reputation in Great Britain. It is a double-thread machine, and besides the vertical eye-pointed needle, has a curved shuttle or hook (fig. 5, *a*) working below, with a revolving reel, *b*, inside its curve. The reel is of metal, each side being convex externally; and so adjusted on the axle, that the edges are so near together as to admit only one thickness of the thread to pass through (fig. 6). The side view of the whole arrangement is seen in fig. 7 It fits easily within the nearly circular hook, and gives off its thread as required. The thread passes partly round the outer edge of the hook upon a slightly-grooved bevel (*a*, fig. 7), which forms a loop, and passes it between the needle and the thread which it carries with it in descending; the loop is held in position as the needle ascends, and the cloth being moved on, the next descent of the needle takes it through the loop and receives another below it, which renders the first one tightly locked, as in fig. 8. For such work as male and female dressmaking generally, this kind of machine is at present unrivalled, both for the efficiency of its work, and also for the neatness and



Fig. 8.

finish of the machines made for private use. Sewing-machines have been patented in America and England by another American named Blake for sewing the soles on boots and shoes; and so rapid are they in their work, that it is said during the war in the United States as many as 150 pairs of soles have been sewed on army boots in one day by a single machine. Special sewing-machines are also in use for sewing the upper leathers of boots and shoes, for gloves, for embroidery, and various other purposes.

SEXAGE'SIMA SUNDAY (Lat. *sexagesima*, i.e., *dies*, the sixtieth day), the second Sunday before Lent, and roughly reckoned the 60th day before Easter.

SEXAGE'SIMALS, a mode of arithmetical calculation introduced by the ancient Greek astronomers, especially by Ptolemy (q. v.), into astronomical and geometrical reckoning. It was founded upon the division of the circle into 360 parts, and the radius being nearly ⅙th of the circumference, was considered to contain 60 of these parts or degrees. Continuing the same mode of subdivision, each degree (°) on the radius was divided into 60 minutes (′), each minute into 60 seconds (″), and thirds (‴), fourths (⁗), &c., followed in the same relation to each other. Addition and subtraction are not altered in this method, but multiplication, division, and the extraction of roots are so to a considerable extent. Multiplication, the most used of these three operations, was carried on in the descending scale, as in the following example, where λα° δ′ κζ″ is to be multiplied by κθ° ιη′ νδ″, or (substituting Arabic numerals) 31° 4′ 27″ by 29° 18′ 54″:

31°	4′	27″		
29°	18′	54″		
899°	116′	783′		
	558′	72″	486‴	
		1674″	216′	1458⁗
899°	674′	2529″	702‴	1458⁗ = 910° 56′ 21″ 6‴ 18⁗

Here, each of the three numbers, 31, 4, 27, is multiplied by 29; the same three by 18, and the results placed in the line below, one step to the right; and again by 54, and the results placed another step to the right. This arrangement proceeds on the principle that the product of degrees by minutes gives minutes; of minutes by minutes, seconds; of minutes by seconds, thirds; and, in general, the denomination of a product is indicated by the sum of the marks superposed on the two factors. The columns are added and rearranged by Reduction (q. v.). This system, though clumsy and intricate, was a great improvement, as regards facility and accuracy, on the former Greek method; and so much was it admired, that succeeding geometers founded on it a complete system of general calculation, and a work on sexagesimal computation was written by Barlaam (q. v.), who died in 1348. It is almost unnecessary to state, that the terms minutes, seconds, thirds, &c. here employed only denote sixtieths, sixtieths of sixtieths, &c., and *have no other signification;* further, that the degrees, minutes, and seconds in the multiplier are, for the time being, merely abstract units and parts of units. The operation of modern arithmetic known as *duodecimal multiplication* is effected in the same way, the subdivisions being twelfths in place of sixtieths.

SE'XTANT, an instrument for measuring the angular distance of objects by means of reflection. The principle of its construction depends upon the theorem, that *if a ray of light suffer double reflection, the angle between the original ray and its direction after the second reflection is double of the angle made by the reflecting surfaces.* Thus let A and B (fig. 1) be two mirrors perpendicular to the same plane, and inclined to each other, and let SA be a ray of light, which falling upon A is reflected on B, and re-reflected in the direction BC, then ACB is the angle between the original and finally reflected rays, and ADB is the angle between the mirrors. Now, as the angle of reflection is equal to the angle of incidence ∠ SAF = ∠ BAD, and ∠ GBA = ∠ DBC; but ∠ EBC = ∠ BAC + ∠ BCA = (∠ BAD + ∠ DAC) + ∠ BCA = (∠ BAD + ∠ SAF) + ∠ BCA = 2 ∠ BAD + ∠ BCA; and ∠ EBC also = ∠ EBD + ∠ DBC = ∠ EBD + ∠ GBA = 2 ∠ EBD = 2 ∠ BAD + 2 ∠ BDA; therefore ∠ BCA = 2 ∠ BDA, which proves the truth of the theorem. The instrument of which this theorem is the principle is a brass sector of a circle in outline; the sector being the sixth part of a complete circle, for which reason the instrument is called a *sextant.* Fig. 2 shews the essentials of its construction; AMN is the sector whose curved side, MIN, is the sixth part of a circle; A is one mirror wholly silvered, placed perpendicular to the plane of the sector, and on, and in line with, the limb AI, which is movable round a joint at or near A; B is the other mirror, also perpendicular to the plane of the instrument, and silvered on the lower half only, the upper half being transparent; E is an eyelet-hole or small telescope. The graduation runs from N to M (on a slip of silver, platinum, or gold let into the rim), and is so adjusted that when the movable limb is drawn towards N till the mirrors A and B are parallel, the index, which is carried at the foot of the movable limb is opposite zero on the graduation. If we suppose that this zero-point is at N, it is evident that the angle between the mirrors is equal to the angle NAI; and again, if instead of graduating from 0° at N to 60° at M, which is the proper graduation for the sixth part of a circle, the graduation be made from 0° to 120°, that is, each half degree being marked as a degree, and similarly of its aliquot parts, then the angle NAI, read off by the index at I, will shew at once the angle between the incident and finally reflected rays. The mode of using the sextant consists in placing the eye to the telescope or eyelet-hole, and observing one object directly through the unsilvered part of B, and then moving the index till the image of the other object, reflected from A upon the silvered part of B, coincides with, or is opposite to the first object, then the angle, read off at I, gives the angle between the objects. For additional accuracy, a vernier is attached to the foot of the movable limb.

Fig. 1.

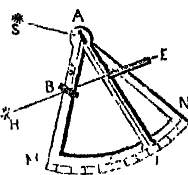


Fig. 2.

The sextant is capable of very general application, but its chief use is on board ship to observe the altitude of the sun, the lunar distances, &c., in order to determine the latitude and longitude. For this purpose, it is necessary to have stained glasses interposed between the mirrors A and B, to reduce the sun's brightness. These glasses (generally three in number) are hinged on the side AM, so that they may be interposed or not at pleasure. B is the glass through which the horizon is perceived, and has hence received the name of the *horizon-glass;* while the other mirror, from its being attached to the index-limb, is called the *index-glass.*

The sextant is liable to three chief errors of adjustment; 1° if the index-glass be not perpendicular to the plane of the instrument; 2° if the horizon-glass be not perpendicular to the plane of

the instrument; and 3° if, when the mirrors are parallel (which is the case when a very distant body, such as the sun or moon, is observed directly through B, and found to coincide with its image in the lower part of B), the index does not point accurately to 0°; this last is called the *index-error*, and is either allowed for, or is remedied by means of a screw, which moves the index in the limb AI, the latter being stationary. The first two errors are also frequently remedied by means of screws working against a spring, but in the best instruments the maker himself fixes the glasses in their proper position.—The *quadrant* differs from the sextant only in having its arc the fourth part of a circle, and being consequently graduated from 0° to 180°; the *octant* contains 45°, and is graduated from 0° to 90°; while the *repeating-circle*, which is a complete circle, is graduated from 0° to 720°. A common form of the sextant is the 'snuff-box' sextant, which is circular in shape, and as it can be conveniently carried in the pocket, is the form most frequently used by land-surveyors.

The idea of a reflecting instrument, on the principle of the sextant, was first given by Hooke about 1666; but the first instrument deserving the name was invented by John Hadley (q. v.) early in the summer of 1730, and a second, and much improved form of it, was made by him a short time afterwards. Halley, at a meeting of the Royal Society, claimed for Newton the priority of invention; and in October 1730, a Philadelphian, named Godfrey, also asserted his claim as the original inventor, but that learned body decided that Newton's claim was unsupported by even probable evidence, and that Hadley's and Godfrey's inventions were both original, but that the second form (which is almost the same as the common sextant now employed) of Hadley's instrument was far superior to his first form and to Godfrey's.

SE'XTON (corrupted from SACRISTAN, q. v.), is a parochial officer in England, whose duty is to take care of the things belonging to divine worship. He is usually chosen by the inhabitants, but often also by the minister or the churchwardens, the mode of appointment being regulated by the custom of each parish. He sometimes also holds the office of parish-clerk. Women have occasionally been appointed sextons, this being one of the offices which women may fill, and they also have a vote in elections. The office is a freehold office for life, except in the new parishes under Church-building Acts; the duty is to keep the church clean, swept, and adorned; to open the pews; to make and fill up the graves; to prevent any disturbance in church. The salary is paid by the churchwardens, and as to amount depends on custom. In Scotland, the beadle performs similar duties, and is appointed by the heritors.

SE'XTUPLET, in Music. When a note is divided into six parts instead of the usual division into four—as, for instance, a minim into six quavers, or a crotchet into six semiquavers—the group is called a sextuplet, and the figure 6 is generally placed above it. The proper sextuplet is composed of three groups, of two notes each, being, in fact, a Triplet (q. v.), with each of its notes subdivided into two: [music] But a group composed of two successive triplets is sometimes, though not very correctly, also called a sextuplet, and written as such, though it is more correct to divide it into its component two triplets, thus: [music]

SEYCHE'LLES COCOA-NUT, or **DOUBLE COCOA-NUT** (*Lodoicea Seychellarum*), a palm, of which the fruit has some resemblance to a cocoa-nut, although it belongs to a different tribe of palms, being allied to the Palmyra Palm. It is found only in the Seychelles Islands; and the fruit, wafted by the winds to the shores of the Maldive Islands, or found floating in the Indian Ocean, was long the subject of many ridiculous fables, and is still an object of interest and curiosity, and as such one of the minor articles of commerce. The tree grows to the height of 50 or 60 feet, with a tuft of immense leaves. The wood and the leaves are used for a variety of purposes, like those of other palms. The 'cabbage' or terminal bud is eaten. The fruit is often a foot or a foot and a half long, in shape like a melon, its outer husk green, the interior near the base divided into two parts, at first filled with a white sweet jelly, which changes into a white horny kernel. The shells are used for making vessels of various kinds, often beautifully carved and ornamented.

SEYCHE'LLES ISLANDS, situated nearly in the centre of the Indian Ocean, between 3° 40'—5° 35' S. lat., and 55° 15'–56° 0' E. long., a group of more than thirty isles, resting on an extensive bank of sand and coral, and forming the most important of the dependencies to the colony of Mauritius. The principal are Mahé, Praslin, Silhouette, La Digne, Curieuse, St Anne, Aux Cerfs, Frégate, Marianne, Longue, and Du Sud Est. Mahé, the most considerable and populous of the group, and the seat of government, is 18 miles long, and from 3 to 5 broad. The islands are mountainous, often rising abruptly from the sea, and are clothed with the most luxuriant verdure; one of the peaks, named Mont Blanc, in Mahé, attains an altitude of 2000 feet. The principal port is Victoria, on the north-eastern side of the island of Mahé, the houses of which are chiefly built of wood, and are much subject to the ravages of the white ant.

The S. were known to the early Portuguese navigators, who bestowed on them the title of Isles do Mascarenhas; subsequently, the French renamed them Iles La Bourdonnais, and finally changed their appellation in honour of the Count Herault de Seychelles. The S. were among the earlier discoveries of the Portuguese, after the accomplishment of their first voyage to India. They were first settled by the French in 1756, who commenced the cultivation of spices, under circumstances so favourable as to induce a belief in a lucrative competition with the more easterly colonies of the Dutch. The immunity of the S. from the hurricanes which periodically visit the neighbouring seas, rendered them peculiarly suited for this purpose, which was only defeated by the suicidal destruction of the spice-plants by the French occupants, to prevent their falling into the hands of the English in 1778. On the cession of Mauritius, the S. were finally taken possession of by Great Britain. The islands produce a large quantity of timber suitable for ship-building purposes; and the S. cocoa-nut, which is indigenous only in the S., and the nuts, leaves, &c. of which are applied to a great variety of domestic purposes by the natives. Sugar was formerly cultivated. Cotton flourishes here, and is now being brought into notice as a staple export. Cocoa-nut oil and tortoise-shell are also among the articles of commerce; but the want of labour is the great obstacle to a more general development of these naturally fertile isles. The introduction of coolie labour from India is now under consideration, and, combined with the present rapid steam-communication to Suez, would tend greatly to place the S. in the forward position which their important geographical situation fully warrants.

The population of the S., as taken at the last census (1861), was 7486 souls, 700 of whom are employed in the shipbuilding yards and factories.—See Sir Edward Belcher's *Account of the Seychelles; Voyage of H.M.S. Leven and Barracouta*, by Captain Owen, R.N.

SEYMOUR, FAMILY OF. This family, whose history is largely interwoven with that of England, was originally settled at St Maur—whence its name—in Normandy. Coming over to England, the Seymours obtained lands in Monmouthshire as early as the beginning of the 13th century. They acquired estates at Hatch Beauchamp, Somersetshire, by marrying an heiress of the Beauchamps early in the 15th century. In 1497, we find the head of the family, Sir John Seymour, employed in suppressing the insurrection of Lord Audley and the Cornish rebels, and subsequently accompanying King Henry VIII. to his wars in France, and to the Field of the Cloth of Gold. Of the issue of this worthy knight one daughter became the wife of Henry VIII., and mother of Edward VI.; one son, Thomas, created Lord Seymour of Sudeley, became Lord High Admiral of England, and the second husband of Henry's widow (Catherine Parr), and ended his life on the scaffold, being attainted of high treason. Sir John's eldest son, Edward, who held many high positions in the court of Henry, was created Lord Seymour of Hache, and Duke of Somerset in 1546–1547. He had been sent into France by Henry to settle the disputed question of the border of the English possessions there, and secured the confidence of the king so far, that he was left by him one of his executors and one of the council of the young Prince Edward. He was subsequently made Lord High Treasurer, and eventually 'Protector and Governor of the King and his realms.' (See EDWARD VI.). His subsequent fall, after a two years' tenure of his all but regal power, by the influence of Dudley, Earl of Warwick and Duke of Northumberland, was followed by an attainder of his honours, which was not reversed for more than a century. The eldest son of the Protector by his second marriage, being created by Elizabeth Earl of Hertford, married the Lady Catharine Grey, a grand-niece of Henry VIII., sister of the unfortunate Lady Jane Grey—a marriage which entailed on him a long imprisonment and a heavy fine. His grandson, who succeeded him in the Earldom of Hertford, was also sent to prison in the Tower of London for marrying the Lady Arabella Stuart, cousin of James I. of England; but subsequently, playing a conspicuous part in the royal cause in the civil wars, obtained in his own favour a reversal of his ancestor's attainder (see above), and in 1660 took his seat in the House of Peers as second Duke of Somerset, although the descendants of the first duke, by his first marriage, were then in existence. He died in 1675, and his ducal title passed to a cousin, on whose death it was inherited by Charles Seymour, known in history as the 'Proud Duke of Somerset,' a nobleman whose style of living was ostentatious and haughty in the extreme, and who filled several high posts in the courts of Charles II., William III., and Anne. He married the heiress of the Percies, by whom he had a son, Algernon, 7th duke, who was created Earl of Northumberland, with remainder to his son-in-law, Sir Hugh Smithson, the ancestor of the present Percy line. On the death of this duke, a curious peerage case arose, the title being claimed by the descendants of the first duke by his first marriage, on the failure of the younger branch; and the attorney-general having reported in favour of the claim, Sir Edward Seymour took his seat in the House of Peers as 8th Duke. From him the present holder of the title is third in direct descent.

SEYNE, LA, a small but rapidly increasing seaport of France, on the shore of the Mediterranean, in the dep. of Var, three miles south-west of Toulon. Fishing and navigation are the chief employments. Pop. (1856) 6419, (1862) 9070.

SE'ZZÉ, or SEZZA, a city of Central Italy (Papal States), legation of Velletri, with 8000 inhabitants. It is a very ancient city, and still preserves some remains of a triple wall of Cyclopean architecture, which surrounded the rock on which it stands.

SFORZA, a celebrated Italian family, which played a most important part in the affairs of Italy during the 15th and 16th centuries, swayed the destinies of Northern Italy for many years, and allied itself with the first sovereign houses in Europe. Its founder was a peasant of Cotignola, in the Romagna, by name *Giacomo*, or *Muzio* (sometimes combined by historians into *Giacomuzzo*) *Attendolo* (born 1369), who deserted his trade of wood-cutting to become a 'condottiere,' and by his intelligence and courage rose to a high position in the band to which he belonged. Count Alberigo de Barbiano, the founder of Italian 'condottierism,' bestowed upon him, on account of his prowess, the name of SFORZA (Ital. 'the forcer'); and such was his reputation among his comrades, that he speedily found himself the independent leader of a band of condottieri, and offered his services to the king of Naples. Queen Joanna II. made him constable of that kingdom, and in exercise of his office, he chased away the Aragonese, and others, who attempted to deprive her of her dominions; but dying soon after (4th January 1424), he left his devoted followers to the chieftainship of his natural son, FRANCESCO S., then 23 years of age, who was as brave and enterprising as himself. Francesco, as was the custom of the time, sold his sword to the highest bidder, and without the slightest scruple fought for or against the pope, Milan, Venice, and Florence. He invented an improved system of tactics, and it soon came to be taken for granted that victory was certain for the party which he supported. It was thus no great act of condescension in the Duke of Milan, the haughty Visconti, to confer upon him the hand of his daughter, Bianca, with Cremona and Pontremoli as a dowry, and the promise of succeeding to the duchy itself. Meantime, S. took the march of Ancona from the pope (1434), added to it Pesaro (1443), and by a judicious combination of force and stratagem, obtained his elevation to the dukedom of Milan (26th February 1450), after the decease of his father-in-law. He solidly established his authority over all Lombardy, and several districts south of the Po; acquired the esteem of Louis XI., who gave up to him Savona and Genoa; and after gaining the universal love of his subjects, died 8th March 1466. Though uninstructed, he possessed considerable eloquence, and loved and protected letters. The successors to his power possessed few or none of his distinguished talents. His son, GALEAZZO-MARIA S. (1466—1476) was a true tyrant, gloating over the torments of his victims, and a monster of debauchery, prodigality, and ferocity, without a single redeeming feature in his character. He was assassinated (26th December) at the porch of the cathedral of Milan. His son GIOVANNI-GALEAZZO S. (1476—1494) succeeded, under the regency of his mother, Bona of Savoy, who held the reins of government with a firm hand. But she was forced to give up (1480) her able coadjutor, Simonetta, to the vengeance of her brother-in-law, Lodovico Maria, surnamed 'the Moor,' from his dark complexion; and three days

after Simonetta's execution, the ambitious Lodovico banished herself, and assumed the regency. Finding the young duke in his way, Lodovico put him and his wife, Isabella of Calabria, in prison, and was immediately threatened with attack by the king of Naples, a danger which he attempted to ward off by giving his daughter, Biauca, with a dowry of 400,000 ducats, to the emperor Maximilian I., and by stirring up Charles VIII. of France to assert his claims to Naples. Soon afterwards, Duke Giovanni-Galeazzo died, poisoned, as some believe, by his uncle, 20th October 1494. LODOVICO-MARIA (1494—1500) obtained his investiture as duke, and becoming alarmed at the rapid progress of the French in Italy, he joined the league against them, and was rewarded for his perfidy by being driven from his duchy, which was seized by the troops of Louis XII. (1499). The following year he made an ineffectual attempt to regain possession, was made prisoner, and carried to France, where he died in 1508. He possessed great talents, combined unfortunately with a low morality, which led him to value astuteness more than everything else; but his encouragement of letters and of the fine arts, will preserve his name to posterity. His eldest son, MASSIMILIANO S. (151? –1515), regained the duchy of Milan after the reverses suffered by Louis XII., and with the aid of the Swiss steadily repulsed the various energetic attempts of the French to recover it; but after the battle of Marignano (1515), he abandoned his rights to the French for a pension of 30,000 ducats, glad to be free from the insolence and exactions of his allies, and the attacks of his enemies. His brother, FRANCESCO-MARIA S., succeeded nominally to the Milanese after the battle of Pavia, but he was a mere puppet in the hands of Charles V., and on his death, 24th October 1535, and the extinction of the main line of the house of S., the duchy was quietly swallowed up by Austria. The Lords of Pesaro (extinct in 1515), the Counts of Santa-Fiora, in Tuscany, still existing, and the Dukes of Sforza-Cesarini, descend from collateral branches of the family.

SFORZA'TO (Ital. forced), in Music, often contracted *sf*, a term used to indicate that the note over or under which it is placed is to be played with strength and emphasis. A higher degree of emphasis is indicated by *sff*, or *sforzato assai*.

SHAD (*Alausa* or *Alosa*), a genus of fishes of the family *Clupeidæ*, differing from *Clupea* (the Herring, &c.) in having the upper jaw deeply notched. The teeth are very small, on the jaws only, and often wanting, at least in the adult fish. The species are numerous, inhabiting the sea, but some of them ascending rivers like the salmon, and spawning there. They are very like herrings in form and appearance, and on this account, and their large size, the British species receive from Scottish fishermen the name of *King of the Herrings*. The herrings of extraordinary size, of which the capture is sometimes reported, are probably always shad.—The COMMON S., or ALLICE S. (*A. communis*), is rather thicker and deeper in proportion to its length than the herring. It is found on the British coasts, and in the lower part of some of the large rivers, more abundantly in the Severn than in any other British river. It attains a length of two, or even three feet, and a weight of from four to eight pounds. It has no teeth. There is a single black spot behind the gills. Its flesh is of good flavour.—The TWAITE S. (*A. finta*) is more plentiful on the British coasts, and is the common S. of the Thames, but the foul state of the river has now made it of very rare occurrence above London. It is smaller than the Allice S., seldom exceeding 16 inches in length; there are small teeth in both jaws, and a row of dusky spots along each side of the body. The flesh is coarser, and less esteemed than that of the Allice S., but much used for food wherever the fish is plentiful. This species spawns later in the year than the last, and in order to permit it to deposit its spawn, its capture in the Thames is prohibited after the end of June. It abounds in many of the rivers of France, and other parts of Europe.—A species of S., generally weighing about four or five pounds, but sometimes twelve pounds, is very abundant during some months of the year in some of the North American rivers, as the Hudson, Delaware, and Chesapeake, and forms an important source of wealth. It is highly esteemed for food. Great quantities are salted.

SHA'DDOCK (*Citrus decumanus*; see CITRUS), a tree, which, like the other species of the same genus, is a native of the East Indies, and which has been long cultivated in the south of Europe. It is said to derive its English name from a Captain Shaddock, by whom it was introduced into the West Indies. It is readily distinguished from most of its congeners by its large leaves and broad-winged leaf-stalk; it has very large white flowers, and the fruit is also very large, sometimes weighing 10, or even 14 pounds, roundish, pale yellow; the rind thick, white and spongy within, bitter; the pulp greenish and watery, subacid, and subaromatic. It is a pleasant, cooling fruit, and much used for preserves. The tree is rather more tender than the orange, but with proper care is often made to produce fine fruit in orangeries in Britain.

SHADOW is a portion of space from which light is debarred by the interposition of an opaque body. If the luminous body be too near, or too large to be considered as a mere point, then each atom of the light-giving surface throws its own shadow independent of the others. We have thus in reality a multiplicity of shadows overlapping each other, and forming what in common parlance is 'a' shadow of the opaque body, which is darkest at those places where all the separate shadows overlap each other, and becomes lighter as it gradually falls beyond the limits of more and more of these separate shadows. See PENUMBRA. The depth of a shadow depends from mere force of contrast on the intensity of the light around it; it also depends much on the nearness of the object, as compared with its size, to the surface upon which the shadow is thrown; for the rays of light by their properties of reflection, refraction, and dispersion tend to bend 'round' the opaque object, and the increase of distance between an object and its shadow allows more scope for this action.

SHADWELL, THOMAS, a dramatic writer of some note in his day, though now only remembered as the 'Mac-Flecknoe' of Dryden's satire, was born in 1640 in Norfolk. He was educated for the law, but not finding it a pursuit to his mind, he deserted it, and after an interval of foreign travel, betook himself seriously to literature. His first comedy of *The Sullen Lovers* (1668) had great success, and he continued from year to year to entertain the town with a succession of similar pieces, a complete edition of which was published after his death in 4 vols. 12mo. The immortality which these must have failed to achieve for him, he was fated to attain in a way somewhat less desirable. With Dryden he seems, in the earlier portion of his career, to have been on terms of friendly intimacy; but literary jealousies divided them, and the quondam friend became a favourite butt for the shafts of Dryden's

deathless ridicule. Though his works—hasty and careless as they are—exhibit lively talent and considerable comic force, all that the literary world now knows of S. is, that 'Shadwell never deviates into sense.' It might a little console him, under the satire of his enemy, that he succeeded him in the post of poet-laureate, which in 1688 it became necessary for Dryden to resign. He did not long survive to enjoy it, however, as in 1692 he died, it is said of an overdose of laudanum, a drug in which he was wont to indulge himself.

SHA'FIITES, the name of one of the four principal sects of the Sunnites (q. v.), or 'orthodox' Muslims. Its name it received from its founder, Abu Abdallah Mohammed Ibn Edris, called Al-Shafei, from one of his ancestors who descended from Mohammed's grandfather.

SHAFT, the body of a column, extending between the base and capital. In Gothic architecture, the term is applied to the small columns clustered round piers, or in the jambs of doors and windows. In the early styles, the shafts are frequently of finer material than the pier, such as Purbeck marble, and polished and banded. In later examples, the shaft is generally attached, and of the same piece as the pier. For illustration, see COLUMN.

SHA'FTESBURY, commonly called SHASTON, a very ancient town of England, a municipal and parliamentary borough in Dorsetshire, 27 miles north-north-east of Dorchester. It stands on the narrow ridge of a chalk hill, and commands extensive and beautiful views of the counties of Dorset, Somerset, and Wilts. The date of its foundation is unknown, but it seems to have been a Roman station. In the reign of Athelstan (924—940) it contained two mints and an abbey of Benedictine nuns. Here Canute the Great died in 1036. Pop. (1861) of municipal borough, 2497.

SHAFTESBURY, ANTHONY ASHLEY COOPER, EARL OF, English statesman and philanthropist, is descended from a family intimately associated with the political history and literature of England. Sir John Cooper of Rockbourne, Hampshire, married Anne, daughter and sole heiress of Sir Anthony Ashley of Wimborne, St Giles, Dorsetshire, secretary-at-war in the reign of Queen Elizabeth. Their eldest son, Sir Anthony Ashley Cooper (born 1621), was actively engaged in public affairs during the civil wars. He first espoused the cause of royalty; he then became one of the most eminent of the Parliamentary leaders in the council, and not the least active in the field. When he saw that the restoration was inevitable, he took so prominent a part in bringing back Charles II. that he was raised to the peerage as Baron Ashley. He was a member of the justly infamous 'Cabal' Ministry, and was afterwards appointed to be Lord Chancellor, with the earldom of Shaftesbury. He was the Achitophel of Dryden, by whom his character is drawn with as much truth as power. He hated a calm, lived all his life in intrigues, and in his 62d year his 'fiery soul' wore out his small and fragile body. He will be honoured for all time by men of English race and descent as the author of the Habeas Corpus Act. He also first introduced a bill rendering the judges independent of the crown.—His grandson, ANTHONY COOPER, third earl (born 1671, died 1713), author of the *Characteristics*, the friend of Pope, and the other celebrities of the Augustan age, obtained from Voltaire the questionable praise of being the boldest of the English philosophers. —The sixth earl was for many years Chairman of Committees of the House of Lords.

His son, ANTONY ASHLEY COOPER, seventh earl of S., was born in Grosvenor Square, London, April 28, 1801. He was sent to Harrow, and thence to Christ-Church, Oxford, where he obtained a first-class degree in classics in 1822. He represented the borough of Woodstock from 1826 to 1830; the county of Dorset (in which the family estates are situated), from 1831 to 1846; and the city of Bath from 1847 to 1851, when he succeeded to the earldom. During his long career in the Lower House, he held one or two subordinate posts. He is better known by his attempts to improve the social condition of the labouring classes. As he belonged to the Conservative party, and represented an agricultural county, the manufacturers, and their organs in the press, received his allegations respecting the condition of their operatives in a hostile and antagonistic spirit, and retorted that the wages of families engaged in factories amounted to twice and three times the sum paid to the Dorsetshire labourers. Yet Lord Ashley returned again and again to the charge; and on the death of Mr Sadler, M.P., took charge of the Ten Hours' Bill. The manufacturers declared with alarm that any reduction in the hours of labour would be fatal to our manufacturing supremacy. Successive governments naturally believed these prophecies, and almost all the leading statesmen of the day opposed the Ten Hours' Bill. But public opinion declared in favour of a limitation of the hours of labour. Lord Ashley carried his bill through parliament, and has the satisfaction of knowing that the opponents of the measure admit, without an exception, that it was an act of wise and beneficent legislation, and that their alarms were groundless. When he visited the manufacturing districts, he was honoured with an enthusiastic ovation. He refused to join Sir R. Peel's administration in 1841, because that statesman refused to countenance the Ten Hours' Bill. In 1846, he supported Sir R. Peel in his proposal to repeal the Corn Laws, an act which cost him his seat for Dorsetshire. When he successfully contested Bath against Mr Roebuck in 1847, he appeared on the field of politics as a 'Liberal Conservative.' After his accession to the earldom, S. took a more prominent part in connection with various religious, social, and philanthropic societies. These are so numerous that a list of the associations with which he is in some way officially concerned, would include almost every scheme having for its object the physical, moral, and spiritual improvement of society. He belongs to the Evangelical party in the Church of England, and is a prominent member of the chief church societies. He is married to a daughter of the fifth Earl Cowper, and being thus a connection by marriage of the late Viscount Palmerston (whose government he steadily supported), many of the ecclesiastical appointments and promotions of Evangelical clergymen made by that minister were attributed to his influence. He has followed up the Ten Hours' Bill by obtaining the assent of parliament to other measures regulating defective workshops and factories, night work, and the treatment of children by their employers in trades and manufactures. His labours have been powerfully seconded by oratorical gifts of no mean excellence.

SHAG. See CORMORANT.

SHAGREE'N is generally understood to mean shark skin dressed and rubbed down smooth or not; but the Oriental shagreen, formerly in so much repute, consists of portions of the skins of horses, asses, camels, and oxen, the part used being strips taken from head to tail along the centre of the back. These strips are prepared by soaking in water and currying; and when in the proper

condition, they are laid on the ground, and the seeds of *Chenopodium album* are sprinkled over them; a board or piece of felt is then placed on the seeds, and by pressure the hard seeds are forced deeply into the skin, which is then hung to dry. When dry, the seeds are removed by shaking, and the skin pared down with a proper knife nearly, but not quite as low, as the bottom of the depressions caused by the seeds. After this the skin is again soaked, and the parts compressed by the seeds now rise up and form elevations, which are increased by washing in a solution of salt. The last operation is dyeing them of various colours, green being the favourite one. Owing to the difference of texture produced by the operations of compressing by the seeds, paring, &c., the colour is taken irregularly; and when dyed green, the material somewhat resembles malachite in appearance when dried and polished. It was at one time a very favourite material in Britain for covering small cases and caskets of various kinds, especially spectacle-cases.

SHAH (Persian, *prince, king*), the general title of the supreme ruler in Persia, Afghanistan, and other countries of Southern and Central Asia. The sovereign, however, may, and frequently does, decline the title, assuming in its place that of *Khan* (q. v.), an inferior and more common appellation. The same title can also be assumed by any of the shah's sons, and upon all the princes of the blood the cognomen *Shah-zadeh* is bestowed.

SHAH-JEHAN, or 'King of the World,' the title assumed on his accession to the throne by Khorrum Shah, the third son of Selim Jehan-Ghir, and the fifth of the Mogul emperors of Delhi. He was during his father's reign employed in military expeditions against the Rajputs, the independent Mohammedan states of the Deccan, and the Afghan tribes around Candahar, in which he greatly distinguished himself by bravery and military skill; but on his return, he was forced into rebellion (1623) by the intrigues of his enemies at court, and was still unreconciled to his father at the latter's death in 1627, when he was at once saluted as emperor by the nobles. At his accession, the empire had reached the summit of its greatness, but the causes which led to its rapid decline at the same time unmistakably shewed themselves. The territory was too extensive for the system of government which was generally pursued by the Moguls; the discordant parts were unconnected by any bond of union; the supreme ruler was looked upon in many provinces as a mere tax-collector; and with the thus necessary absence of any spirit of loyalty, insurrections were frequent in all the provinces. The chief events of S.-J.'s reign were—the war against the Deccan sovereignties, which resulted in the complete destruction of the kingdom of Ahmednuggur (1631), and the subjugation (1636) of those of Beejapur and Golconda; an indecisive contest against the Uzbeks of Balkh (1644—1647); two unsuccessful attempts to recover Candahar from the Persians; and a second successful war, conducted by his third son, Aurungzebe, against the Deccan princes (1655). But in 1657 the emperor fell dangerously ill, and his four sons, who were ambitious of attaining supreme power, immediately commenced to dispute regarding the succession. See AURUNGZEBE. Ultimately, S.-J. was taken prisoner, and confined in the citadel of Agra till his death, December 1666. S.-J. united the voluptuous profligacy so common in Eastern monarchs with great sagacity, and the strict administration of justice to Moslem and Hindu alike. In his later years he became avaricious, increased the taxes, and confiscated the property of his wealthier subjects on the slightest pretexts. The magnificence of his court was unequalled; the splendid 'peacock-throne' was constructed by his orders at a cost of about £7,000,000, and many magnificent public buildings executed under his direction remain as monuments of his greatness. Chief of these are the city of Shah-Jehanabad, and the superb mausoleum of Tajmahal (q. v.). Yet so strict was his financial management, that he left a well-appointed army of 200,000, and a treasury containing £24,000,000 to his son Aurungzebe.

SHAH NAMEH, Book of Kings, the title of several Eastern works, the most celebrated of which is the Persian poem of this name by Firdusi (q. v.), containing the history of the ancient Persian kings in about 60,000 distichs, and written by the order of Sultan Mahmud of Ghizni, in the space of thirty years. Another work, in Turkish, under the same name, comprises the history of all the ancient kings of the East, and was written by Firdusi Al-Thauil. Bajazet II., to whom the book was dedicated, ordered the author to reduce it from its original bulk of 300 volumes to 80. Firdusi, however, felt so mortified at this proposal, that he preferred leaving the country altogether, and emigrated to Khorassan, in Persia.

SHAKE, in Music, an embellishment produced by the continued and rapid repetition of one note alternately with another either a whole tone or semitone above it. Its sign is *tr* (the first two letters of the Italian *trillo*), placed over or under the principal note. For example: [musical example], is played thus: [musical example]; the exact number of repetitions being indefinite. A shake is often preceded by an Appogiatura (q. v.), and is very generally finished with a turn, as [musical example], played: [musical example]

We may have shakes on two notes at once; and a series of shakes on several notes is called a chain of shakes.

SHAKSPEARE, WILLIAM, the chief literary glory of England, was born at Stratford-on-Avon, in Warwickshire, it is believed, 23d April 1564. Certain it is, as vouched by the parish register, that his baptism took place three days after, on the 26th. His father, John Shakspeare, seems to have belonged by birth to the class of yeomen. His mother, Mary Arden, was of more distinguished origin. She came of a good old Warwickshire family; and when married, she brought to her husband as dower a property called Asbies, 54 acres in extent, besides an interest in certain other lands at Wilmecote, and a small sum of money. In a contemporary document, John Shakspeare is described as a *glover*; and this trade, at that time a more important one than it has since become, there is evidence to shew that he conjoined with that of a farmer and rearer of stock. His earlier career was one of steady prosperity, and the consideration in which he came to be held as a citizen, is shewn in the fact of his having, in 1569, been elected chief magistrate of Stratford. Of a family of four sons and four daughters born to him, William was the third child. At the free grammar-school of Stratford there can be little doubt the young S. received his entire

education. As to the precise character and amount of this, there has been much controversial conjecture; some writers maintaining, on the internal evidence of his works, that he must have enjoyed a thorough classical training, whilst others represent him as probably destitute of any such youthful advantage. The celebrated 'And though thou hadst small Latin and less Greek' of his friend Ben Jonson, which has been frequently quoted as certifying his almost utter ignorance, seems, if anything, to tell the other way. It assures us that, of both languages, he knew something; as to *how much* of either he may have known, it affords us scarce a ray of light, inasmuch as it is impossible for us even to guess at the amount of classical attainment sufficient, in the eyes of a scholar, and something of a pedant, like Jonson, to entitle a man to the praise of having *much* Latin and Greek. What Ben might contemptuously style 'small Latin' was, in all probability, as it seems to us, a fair working allowance of it.

Meantime, misfortune had overtaken, and more and more come to press heavily on John Shakspeare; in consequence of which, William, now somewhat over fourteen, was withdrawn from school, and set to do something for his living. How he was employed from this time till his departure for London, it is impossible to make out with distinctness. One tradition informs us that, for a time, he served as apprentice to a butcher; and it is said that, 'when he killed a calf,' the poetry of his nature prompted him to ennoble the operation as he could to himself, by 'doing it in a high style, and making a speech.' Unhappily, none of his speeches have come down to us, so that rather more of a mythical atmosphere than might be wished surrounds this pursuit of the ideal under difficulties. But that he was for some time a butcher's assistant, is as likely to be true as not. Another story has it, that for some years he was a schoolmaster; whether or not in birching his boys he dignified the act as in the calf's case, tradition has omitted to inform us. Both stories are not unlikely to be true; the fact of the matter probably was, that in those years young S. lived miscellaneously as he could. Out of the cloud of uncertainty which shrouds this period of his life, two facts, however, emerge as beyond question—his marriage, and the birth of his eldest born. As soon as may be after the 28th November 1582—on which day the licence was procured at Worcester—Shakspeare, a lively lad going nineteen, was married to Anne Hathaway of Shottery, a hamlet some mile or so out of Stratford, a damsel about eight years older than himself; and six months afterwards a daughter was born to him, whose baptism bears record 26th May 1583. The obvious inference from this promptitude on the part of his spouse certain of his admirers have sought to evade. It is said, and we believe it is certain, that a mere betrothal before witnesses, to be followed within some reasonable undefined period by the religious ceremony, was then and there held to constitute a valid marriage; and this, it is conjectured, may in S.'s case have prefaced the more formal sanction. And of course it may; the licence of conjecture is unlimited; and all to whose comfort in admiring a great genius it is essential to regard him at every point of his career as also a pattern of everything that is proper, must of course be made welcome to this one. The only other children born of the marriage were twins, a boy and a girl, baptised 2d February 1585. The boy (Hamnet) did not survive his father, dying in his twelfth year.

As nearly as can be made out, in the year 1586, S., then 22, left the neighbourhood of Stratford, and betook himself to London. A local tradition assigns as his reason for doing so a mishap which befel him, and a little imprudence consequent on it. The future poet, it is said, while out on a nocturnal poaching expedition in the deer-park of a neighbouring magnate, Sir Thomas Lucy of Charlecote, was caught by the keepers, kept for the night a prisoner, and arraigned before Sir Thomas—a justice of peace—in the morning. What passed, is not recorded; but—as the old rumour goes—whatever it was, it excited the ire of S., who avenged himself, as a bard naturally might, by circulating 'a bitter ballad' in which the good knight was satirised. A further prosecution was for this irreverence directed against him, to escape which it was that he is said to have fled to London. No anecdote concerning S. has been more widely accepted than this, or, on the whole, seems better to deserve acceptance. An obvious allusion to the Lucies of Charlecote in the *Merry Wives of Windsor*, which identifies their coat of arms with that of Justice Shallow, would of itself afford strong confirmation of it. Further, Oldys, an antiquary who died in 1761, and had busied himself much about materials for a life of S., certifies the story on something like fair evidence, and gives the first verse of the obnoxious pasquinade, as remembered in the district. It is more coarse and scurrilous than witty; but inasmuch as it would be easy to adduce passages from the admitted writings of S., in which the coarseness to at least an equal extent preponderates over the wit, this will scarcely of itself amount to proof that he could not possibly have been its perpetrator. The indisposition which more lately has been shewn to attach any credit to the tale, seems to rest entirely on a foolish horror of admitting anything as possible in the conduct of the poet which might any way seem to conflict with the reverence now universally accorded to his genius.

No certain details have come down to us as to S.'s earlier relations with the London theatre. According to one tradition, he was content at first to turn a penny by holding horses at the door. According to another—which seems in a natural sequence with the foregoing—we find him admitted inside on his promotion, though as yet only in the humble capacity of prompter's attendant. What is certain in the matter is this, that if at any time he was thus meanly occupied, it could have been only for a brief period, as very speedily we have note of him as a man of some importance, at once dramatist, actor, and shareholder in the Blackfriars Theatre. As an actor—though we find one contemporary allusion to him as 'excellent in the quality he professes'—he seems at no time to have shone especially, being rather respectable than eminent. As dramatist, his magnificent powers were at once recognised, and in no long time had won for him the very foremost rank among the writers for the stage of his time. The extraordinary rapidity of his rise is shewn in this indubitable reference to him in Spenser's *Tears of the Muses*, published so early as 1591, only some five years after S.'s arrival in London:

> And he, the man whom Nature's self had made
> To mock herself, and truth to imitate,
> With kindly counter under mimic shade,
> Our pleasant Willy, ah, is dead of late.

The reference here has indeed been surmised to point at Sir Philip Sidney, by Spenser elsewhere alluded to under the figure of Willy a shepherd; but the surmise is, on various grounds, inadmissible. The first two lines have the closest critical pertinence to the character of S.'s genius; as applied to that of Sidney, they are, by comparison, vague and unmeaning. Further, the 'mimic shade' in the

third line, together with the whole context of the passage, makes it certain a dramatic writer is alluded to; and this Sidney was not. Moreover, the stanza which follows, wherein of 'that same gentle spirit' it is said that he

> Doth rather choose to sit in idle cell,
> Than so himself to mockery to sell,

must needs be held to indicate a man at the time living; and Sidney had died in 1586. The 'Ah, is dead of late!' which, literally taken, would suit Sidney, and not S., must, in the light of the succeeding couplet, be interpreted as referring to some temporary remission on the part of the latter of his wonted dramatic productiveness; and this, if not otherwise to be accounted for, we might explain by supposing him at this time engaged on his two elaborate poems, *Venus and Adonis*, and *The Rape of Lucrece*, published not long afterwards. The year after (1592), we find a contemporary and brother dramatist, Henry Chettle, making the *amende* to S. for an offence given, in terms most respectfully appreciatory of his excellences at once as a man and an author; and in 1598, Francis Meres, in his *Wit's Treasury*, writes of him as admittedly the 'most excellent among the English for both kinds of tragedy and comedy.' We have ample evidence besides of the unrivalled acceptance his works obtained from all classes; not only were they in the wider sense popular, but they brought him special marks of favour and approval from Queen Elizabeth and her successor, James—who is said to have honoured the poet with an 'amicable letter' from his own hand—and procured him the patronage and friendship of some of the most accomplished men of rank of the time, more notably, Henry Wriothesley, Earl of Southampton, to whom he dedicated his *Venus and Adonis*, and *Rape of Lucrece*; and William Herbert, Earl of Pembroke, commonly held to be the 'Mr W. H.,' to whom, as their 'only begetter,' his *Sonnets* are addressed.

S. was plainly—as men of *consummate* genius mostly are—a man of shrewd solid business ability; and throughout, his material prosperity kept pace with the growth of his poetical reputation. He became early, as we saw, a considerable shareholder in the Blackfriars Theatre. In the Globe, subsequently erected, he was also a part proprietor. To both he contributed dramas, and from his gains in the triple capacity of actor, author, and sharer of the general profits, he rapidly amassed a fortune. His local attachments were strong, and it seems to have become, as his wealth increased, one main object of his ambition to settle himself as a substantial country gentleman in his native district, to which annually he made a visit. We find him, with this view, from time to time making purchases there of house and landed property. By and by, his visits to Stratford became more and more frequent; and it is positively certain that previous to the year 1613, he had ceased to reside in London, and finally established himself at Stratford. Of his last years there spent, further than that they lapsed peacefully in honour, and the exercise of a liberal and kindly hospitality, nearly nothing is known. There is evidence of his having more or less occupied himself in agricultural pursuits, and good reason to believe that, though withdrawn from other active concernment with the stage, he still continued to write for it. His death took place on his 53d birthday, the 23d April 1616. In the diary of a Mr Ward, the vicar of Stratford, writing *apud* 1660, the cause of it is thus given: 'Shakspeare, Drayton, and Ben Jonson had a merry meeting, and, it seems, drank too hard, for Shakspeare died of a fever then contracted;' but that of this drinking the poet's death was a consequence is at best a doubtful inference.

That S. erred and sinned at times like others, we know from the passionate confessions of his *Sonnets*, in considerable portions of which the self-reference is too plain to be denied; but that, whatever his occasional frailties, he was essentially a man of noble and estimable character, there is a complete concurrence of testimony. He was obviously of most kindly and lovable dispositions; his 'pleasurable wit and good nature' made him delightful as a companion; and it was as 'gentle Will Shakspeare' that he was familiarly known to his contemporaries. In particular, with his associates and rivals in writing for the stage, his relations would seem to have been of the most cordial and even endearing kind. The gruff Ben Jonson writes of him after his death: 'He was honest, and of an open and free nature,' assures us that in 'his well-turned and true-filed lines' we see but an authentic reflex of his beautiful 'mind and manners;' and avers that he 'honours his memory only on this side idolatry.' As a slight shadow on this pleasing picture, it has been shrewdly surmised that he was not very happy with his wife. Evidence of this has been sought in certain passages in his dramas; but obviously any inference from these is most precarious. The neglect of her in his will, except in one curt clause interlined, dismissing her with a legacy of 'his second-best bed,' might well seem much more decisive, till Mr Charles Knight greatly reduced its importance by shewing that, the will apart, by the mere operation of the English law, the poet's widow was entitled to *dower*, and thus amply provided for. There is thus (though the query of why *second*-best, if a bed at all was to be left her, may perhaps have a certain pertinence) no very firm basis of proof for the domestic unhappiness of Shakspeare. Still, if anything in his life is certain, it is this, that, spending great part of his time in London, the poet did not find it essential to his felicity there to have the society of his wife; as probably she, on the other hand, though her husband had gone to the metropolis, was content to abide in Stratford, since it seemed to him the desirable arrangement. It is fair, we think, to infer from this that the affection subsisting between the two was a little on the hither side of enthusiasm.

To discourse here at this date of the genius of S. would be only to promulgate platitudes. The lofty eulogy of Dryden—'He was the man who, of all modern and perhaps ancient poets, had the largest and most comprehensive soul'—has since been generally acquiesced in. As dramatist, he is admittedly in the world without a peer; as poet (abstracting the differential forms), there are but one or two names in literature even to be named beside his; and dismissing his claims in either kind, we have in his works such a treasury of gnomic wisdom on all matters of human concernment as no other writer has ever bequeathed to the world. If we add, that this greatest of writers is one of the most unequal—that his works contain more than might be wished of what, as the product of such a mind, we need not scruple to call rubbish—and that nearly every vice in writing might be illustrated from them almost at will, we say simply what is patent to every reader not blinded by the stupid and mindless idolatry which too often of late in many quarters has displaced a rational admiration.

The only works of S. certainly published under his own hand were the two poems *Venus and Adonis* and *The Rape of Lucrece*, which appeared in 1593—1594 respectively. As was naturally to be looked

for in the case of pieces on the stage so popular, certain of his dramas found their way from time to time into print, but no authoritative edition of any of them was issued during his lifetime. The first collected edition of his dramas was issued in 1623, by Heminge and Condell, his friends and co-proprietors in the Blackfriars and Globe theatres. A second edition followed in 1632; a third, in 1664; and a fourth in 1685. In 1709, appeared the edition of Rowe, with a prefatory sketch of the poet's life. Of the 'Shakspearian literature' which followed, and the various re-issues of the dramas, with such masses of critical commentary and emendation as no other writer has ever perhaps been made the subject of, it would be hopeless to attempt an account. It must suffice to mention as successive editors Pope, Theobald, Sir Thomas Hanmer, Warburton, Capell, Stevens, Malone, and Dr Johnson, whose elaborate introductory essay—whatever may be thought of the insolence of much of his criticism of the plays in detail—is perhaps on the whole, as an estimate of the genius of the poet, as satisfactory as any that has since been written. Down to our own time, there has been no remission of activity in this field of literary labour. More recently, the intelligent industry of Mr Charles Knight specially deserves mention; and along with his may be given the names of Mr Dyce, Mr John Payne Collier, and Mr Singer—all of whom have put forth elaborate and valuable editions of the dramas. As we write, an important edition is in course of being issued from Cambridge, under the superintendence of two gentlemen of unquestioned scholarly competence, W. G. Clark and W. A. Wright.

In Germany, S. has long been thoroughly naturalised; and the German enthusiasm in regard of him is, if possible, even greater than our own. It was the celebrated Lessing who first decisively introduced him to notice in a series of essays, exhibiting the immeasurable superiority of his art to that of the pseudo-classical models of the French stage. Since his time, many of the most gifted of his countrymen have devoted themselves to the work of Shakspearian criticism and elucidation. From Goethe we have some exquisite fragments, most notably the criticism of *Hamlet*, occurring in his *Wilhelm Meister*; and after his, the names of Tieck, A. W. Schlegel (whose *Lectures*, of date 1809—1811, almost constitute an era in this special department of literature), Franz Horn, and Gervinus (an English translation of whose elaborate Commentaries has been published), occur as the most illustrious in connection with the present topic. By Tieck and Schlegel together, the work of translation was undertaken; and the result of their joint labours, which takes rank as the standard German S., ranks also, in the opinion of competent judges, as a consummate and almost *unique* specimen of excellence in the translator's art. It has not unfrequently been alleged that, till the Germans made the discovery for them, the English people knew nothing of the greatness of Shakspeare. This is on the face of it ridiculous. The single sentence we have cited from Dryden, and the practical acceptance of it implied in the unexampled attention and industry which never ceased to be directed to the subject, sufficiently of themselves confute so idle a notion. What the Germans really did (and along with their services in the matter, must be included those of our countryman Coleridge, whose impulse and point of view, at least, if not something considerably more, were derived from German sources) was somewhat to methodise and enlighten for us an admiration never deficient, but always, like Jonson's regard for the memory of his friend, 'only on this side idolatry.' The old notion of S. was that of a genius in power and plenitude unrivalled, but licentious in its modes of operation, and more or less chaotic in its results; 'wild above rule or *art*, enormous bliss.' The new German criticism exhibited in the chaos the orderly outlines of a world; co-ordinated the confusion under rules till then unsuspected, and shewed in what before had seemed irregular exercise of power admitted to be magnificent, obedience not less magnificent to a law of artistic evolution. It made calculable, in a word, the orbit of a luminary which had somewhat uncomfortably seemed to be sweeping at random through space. But the English people did not need it to *reveal* the luminary to them; throughout and from the first, they had seen and devoutly worshipped it. Also, to a great extent, it is due to the German enthusiasm of exposition, that over the whole continent, and wherever literature is intelligently studied—some little lingering, dying remnant of French prejudice except—the poet *par excellence* of England is now finally enthroned as the poet also *par excellence* of our whole modern world and civilisation. A Household Edition of the works of S., freed from objectionable passages, has been published by W. and R. Chambers, in 10 volumes.

SHALE, or SLATE-CLAY, an indurated clay, which often forms beds in the coal measures. It is chiefly composed of silica and alumina, in variable proportions, but also frequently contains a considerable amount of carbonate of lime or of oxide of iron. It is of a gray or grayish-black colour, or brownish-red when containing much iron. Its structure is more or less slaty. It is soft, and easily reduced to powder. It is used for making slate-pencils. When free from lime and iron, it is reduced to powder, and used for making fire-bricks, for which it affords an excellent material. S. very often contains a notable quantity of bitumen, and when this is so much the case that the mineral has a shining resinous streak, and crackles and blazes in the fire, emitting a black smoke and a bituminous odour, it is known as *Bituminous Shale*. This variety sometimes passes on the one hand into common S., and on the other into coal. Impressions of ferns and other plants are very frequently found in shale.

Slate, Schist, and Shale are names employed to denote those kinds of rock which are laminated or fissile—that is, which possess a structure readily splitting into thin layers. Shale and schist are almost synonymous, although the latter should be restricted to rocks with their layers irregular or foliated. True slate differs from them in not having its lamination produced by bedding. See SLATE. Nevertheless, all three names are often applied to the same substance.

Shale varies much in its composition. Clay, sand, lime, bitumen, and other bodies, either singly or any mixture of them, are included under the name, if they form rocks which split into layers in the direction of their bedding; clay, however, being an ingredient in most shales. Strange as it may seem, the line between even coal and some kinds of shale is not well defined; and in the case of the Torbanehill mineral, found near Bathgate, the question by which of the two names it should be called, led to a lengthened and costly litigation.

The importance of certain decomposing shales through which sulphuret of iron is disseminated, for the manufacture of alum, has been long known, and the quantity raised for that purpose from the carboniferous beds of Lancashire and Lanarkshire and the lias beds of Yorkshire is very considerable, yielding about 16,000 tons of manufactured alum annually. Shales of a similar kind are worked in France, Germany, and North America.

Bituminous shales—that is, shales more or less

rich in carbon and hydrogen—form another class of these bodies which have, in recent years, attracted much notice as sources of oil for illuminating purposes. It is now (1865) more than twenty years since a Frenchman, named Du Buisson, introduced a method of distilling certain bituminous shales in France, at a comparatively low temperature, so as to obtain burning oil and other products. The process was afterwards tried in England, being used for a time in distilling a Dorsetshire bituminous shale, sometimes called 'Kimmeridge coal.' From this mineral, a burning oil, a lubricating oil, and a naphtha for dissolving caoutchouc, were obtained. But neither in France nor in England did the attempt to make a profitable manufacture succeed: in the former country, the poverty of the shales was the chief drawback; in the latter, the disagreeable smell of the oil, which could not be effectually removed, prevented it from obtaining favour in the market.

On account of these failures, the process fell into abeyance, until it was revived again by the success of the well-known patent of Mr James Young (see NAPHTHA), secured in 1850 for the production of paraffin and paraffin oil from coal. With the exception of the solid paraffin, which Mr Young was the first to obtain on the large scale, and the employment of coal instead of shale, the processes of Du Buisson and Young are essentially the same. The merit of this process is very great, because not only has it created a new and rapidly-increasing branch of industry, in the case of the distillation of paraffin oils from coal, but it has within these few years been applied again, and with great success, to the obtaining of the same products from shale. Those who have paid any attention to the various beds of minerals which go to form what is geologically called the Coal Measures, are aware that it is only the seams of coal, ironstone, fire-clay, sandstone, and limestone, which until very lately have been looked upon as of any industrial importance. Interstratified between these and the other minerals of the series, are numerous hitherto uncared-for beds of carbonaceous or bituminous shale. Many of these shales were found upon trial to yield from 30 to 50 gallons of crude oil per ton; and works—several of them of great size—have accordingly been started in many places over the entire area of the coal formation in Scotland, and also at various localities in England and Wales, for the manufacture of paraffin and paraffin oil from this material. These products, moreover, happen to be obtained with greater facility in a pure state from shale than from coal, so that it is not unlikely the use of coal, as a source of them, will sooner or later be abandoned. Some of the lias shales have likewise been profitably distilled for oil, as well as those of the carboniferous age; and it is thought highly probable that several of the older Silurian and Old Red Sandstone shales may also prove valuable for this purpose. Quite recently, a shale, very rich in oil, has been sent from a country so distant as Brazil for trial in England. It happens that in the manufacture of paraffin oil from coal or shale a good deal of coal-gas is unavoidably produced and wasted; and proposals have already been made to convey this from various large oil-works for consumption in towns. In these days of the wondrous utilisation of waste materials, the obtaining of an illuminating gas as a collateral product of the manufacture of mineral oil, will probably prove before long to be not the least curious.

SHALLOO'N, a light worsted cloth, said to have been first made at Chalons in France, and to have derived its now corrupted name from that place.

SHA'LLOP (Fr. *chaloupe*), a large, open, old-fashioned boat, carrying two masts, rigged as in a schooner. Its principal use was in the fisheries, but it has now nearly given place to luggers and yawls.

SHA'LLOT (*Allium Ascalonicum*), a species of *Allium* (q. v.), a native of the East, introduced into Europe by the Crusaders—from Ascalon, it is said—and much cultivated for its bulbs, which are used like those of the onion, and sometimes for its leaves, which are used like those of the chive. The leaves grow in tufts like those of the chive, but are larger. The S. is generally propagated by the cloves, which are planted just beneath the surface of the ground, or only partially beneath it, in spring, and the crop is ready for gathering in July or August. The flavour resembles that of garlic, but is much milder. In the vineyards of Italy the S. is naturalised.

SHA'MANISM is the ancient religion of the Tartar, and some of the other Asiatic, tribes. It is a belief in sorcery, and a propitiation of evil demons by sacrifices and frantic gestures. The following account of it is extracted from the *Asiatic Journal*. The priests are men or women, married or single. The character is acquired by pretending that the soul of a deceased priest has appeared to the individual in a dream, appointing him or her his successor. If the priests are in function, they wear a long robe of elk-skin, hung with small and large brass and iron bells; moreover, they carry staves carved at the top into the shape of horses' heads, also hung with bells; and with the assistance of these staves, they leap to an extraordinary height. The followers of the Shaman religion have neither altars nor idols, but perform their sacrifices in a hut raised on an open space in a forest or on a hill. Nor are there fixed periods for the performance of their ceremonies; births, marriages, and sickness, uncommon appearances in the atmosphere, or public calamities, are generally the occasions which call for them. The animal to be sacrificed is generally fixed upon by the Shaman or the donor; and after the persons uniting in the ceremony have assembled, the Shaman enters the hut, chanting certain words, sprinkles on all the sides of the hut, and over the fire, spirits and milk, and then orders the animal to be killed, which is done by its heart being torn out. The skin of the victim is then stripped off, and its flesh, with the exception of a few pieces which are thrown into the fire, is consumed by the persons assembled. See also LAMAISM.

SHAMMAI (not, as has often been done, to be confounded with Sammeas), an eminent doctor of the Jewish law at the time of Herod, head of a most important school, and supreme judge of the Sanhedrim (Ab-Beth-Din) during the presidency of Hillel (q. v.), along with whom he is, indeed, generally mentioned, and of whom he was, as it were, the very counterpart. Very little is known of the history of his life. He most probably was born in Palestine, and most energetically participated in all the political and religious complications of the country. There was a harshness and rigidity in his character, which contrasts most strikingly with Hillel's proverbial patience. His religious views were painfully strict, and he even tried to extend the rigour which he imposed upon himself, to the youngest children; but the zealotism with which later times have charged him, is not his, but his school's, 'the House of Shammai,' as it was called. This seems, under the adverse circumstances of the commonwealth—sedition within, and the approaching enemy without—to have developed a fanatical zeal that at times surpassed all bounds,

and chiefly tended to foster that exceptional exclusiveness which proved both the bane and the saving of Judaism. The discussions of the two rival schools, of which that of S. preponderated long after the master's death, turned exclusively upon points of positive law. There is only one curious metaphysical debate recorded, viz., whether, as one school held, 'it was better for man to have been created or not;' or, as the other asserted, 'it would have been better if he never had been created.' Finally, they both agreed in the latter axiom, but with the addition—'but since he is now in this world, let him be careful in his actions.' We need hardly point to the strange light which this discussion and final decision throw upon the times of unequalled national misery that begot them.

SHA'MMOY. See LEATHER.

SHA'MO, SHA-MOH, or **GOBI,** words signifying Sandy Sea or Desert. Geographers divide the region so called into an eastern and western portion. The eastern part of this great desert stretches from the eastern declivity of the Thian-Shan Mountains in long. 96° to 120° E., and about lat. 40° N., as far as the Inner Hing-an; and its width between the Altai and the In-shan range varies from 500 to 700 miles. Through the middle of this tract extends the depressed valley, to which more properly the term 'Sandy Floats' is particularly applicable; it is from 150 to 200 miles across, its lowest depression being from 2600 to 3000 feet above the sea. Sand almost entirely covers the surface of this valley, generally level, but sometimes rising into low hills. Such vegetation as occurs is scanty and stunted, affording indifferent pasture, and the water in the numerous streamlets is brackish and unpalatable. The western portion of this desert, lying east of the Tsung Ling, and north of the Koulkoun, between long. 72°—96° E., and in lat. 36°—37° N., is about 1200 miles in length, and between 300 and 400 across. This region is an unmitigated waste, and north of Koko-nor assumes its most terrific appearance, being covered with dazzling stones, and rendered insufferably hot by the reflection of the sun's rays from these and numerous mountains of sand, which are said to move like waves of the sea. The limits of the western portion of the desert are not easily defined, for near the base of the mountain-ranges, streams and vegetation are usually found. The entire area of S. is about 1,200,000 sq. miles. The general features of this portion of the earth's surface are less forbidding than Sahara, but more so than the steppes of Siberia, or the pampas of Buenos Ayres.—Williams's *Middle Kingdom;* Huc's *Travels.*

SHA'MROCK, a national emblem of Ireland, a leaf with three leaflets, or plant having such leaves, sometimes supposed to be the Wood Sorrel, but more generally believed to be some species of Clover, or perhaps some common plant of some of the nearly allied genera, as the Bird's Foot Trefoil, or the Black Medick. It is not improbable that the name has a sort of general reference to plants with trifoliolate leaves, and that a more exact determination of the species may be as difficult as the attainment of botanical accuracy in regard to the emblematic thistle of Scotland.

The small-leaved clover (*Trifolium repens*) has had a superstitious respect attached to it from early times. According to the elder Pliny, no serpent will touch it. It is said to have been first assumed as the badge of Ireland, from the circumstance that St Patrick made use of it to illustrate the doctrine of the Trinity. See TREFOIL.

SHAMYL, or **SCHAMYL** (Eng. 'Samuel'), the celebrated leader of the independent tribes in the Caucasus, was born at Aul-Himry, in Northern Daghestan, and belonged to a wealthy Lesghian family of rank. He was one of the zealous disciples of Kasi-Mollah, the great apostle of Muridism, and ably seconded his endeavours to compose the numerous feuds of the various Caucasian tribes, and unite them in a bond of antagonism to their common enemy, the heretical Russians. He was one of the foremost in the defence of Himry against the Russians, October 30, 1832, and after the fall of his chief, Kasi-Mollah, and most of his adherents, fought his way alone and severely wounded through the besiegers' ranks. After the assassination of Hamzad-Bey, the successor of Kasi-Mollah, in the end of 1834, S. was unanimously elected 'imaum,' and being absolute temporal and spiritual chief of the tribes who acknowledged his authority, he made numerous changes in the religious creed and political administration, for the purpose of more fully concentrating in himself the whole power. These changes were certainly the chief cause of the great successes which subsequently attended the mountaineers, but it is none the less certain that they produced that sudden collapse of the spirit of independence which took place when the great leader was removed. S.'s change of military tactics, from open warfare to surprises, ambuscades, &c., brought numerous, and sometimes great successes to the arms of the mountaineers. General Ivelitch was severely defeated in 1837, the worst reverse the Russians had yet sustained, and his coadjutor Hafi was forced to make a disastrous retreat. They succeeded, however (1839), in hemming S. into Akulgo, in Daghestan, took the fortress by storm, and put every one of the defenders to the sword, in order to be quite certain that S. should not escape. How he did so is not known, his own followers and the Russians believed him to be dead, when, to the joy of the one and the bitter confusion of the other, he suddenly appeared, preaching with more vigour than ever the 'holy war against the heretics.' In 1843, he conquered all Avares, besieged Mozdok, foiled the Russians in their subsequent campaign, and gained over to his side the Caucasian tribes which had hitherto favoured Russia. This accession of power rendered necessary some change in the government; a civil and a criminal code were promulgated, a regular system of taxation established, and Dargo was made the capital of this Caucasian monarchy, the population of which now (1844) exceeded 1,000,000. But the Russians, under Prince Woronzoff, having changed their tactics, assailed the country on various points at the same time, and the advance gained was secured by chains of forts. The fortune of war, however, steadily alternated till 1852, when Bariatinsky compelled S. to confine himself to the defensive, and deprived him of his victorious prestige. Some of the tribes now returned under Russian authority, and S. (probably owing to his diminished power and resources) was unable to take advantage of the diversion in his favour afforded by the Crimean War; after the conclusion of which the Russians resumed their attacks with more energy, opened a road over the mountains, thus cutting off one portion of the patriots, and compelling their submission. The following year was still more disastrous; 100 villages were destroyed, the inhabitants transplanted to Russian districts, and S. himself defeated, August 11. On April 12, 1859, his chief stronghold Weden was taken after a seven weeks' siege, and his authority, except over the small band of followers who still devotedly adhered to him, was wholly destroyed. For several months he was a mere guerilla chief, hunted from fastness to fastness, till at last (September 6, 1859) he was surprised on the plateau of

Gounib, and after a desperate resistance, in which his 400 followers were reduced to 47, he was captured. His wives and treasure were spared to him, and he was sent to St Petersburg, where he experienced a generous reception from the czar. A few days afterwards, he was assigned a residence at Kaluga, with a pension of 10,000 roubles. Since this period, nothing is known of him; though a rumour of his death was current in Western Europe about three years ago.

SHANGHAI', the most important maritime city of China, situated on the left bank of the Hwang-poo or Woosung River, 12 miles from where it debouches into the southern portion of the mouth of the Yangtse-kiang, in lat. 31° 10′ N., and long. 121° 30′ E. It is a *heen* or *district* city, having a wall 3 miles in circuit, through which 6 gates open into extensive suburbs. The low alluvial plain on which it is situated is of great extent, and intersected by innumerable streamlets and canals, which environ the walls, and permeate the city in various directions. It is a dirty, poorly-built town, the houses are mostly brick, the streets are very narrow, and constantly crowded with people. Few of the buildings rise above the low walls of the city; the only conspicuous objects are the Roman Catholic cathedral, a massive edifice, and the lofty spire of the Baptist chapel. The temples present the same general appearance met with in all Chinese cities. Every city has its Ching-hwang, or temple of the tutelary gods; that of S. is in a picturesque position on a rocky islet, surrounded by a serpentine sheet of water, which is crossed by zigzag bridges. In close juxtaposition to these finest specimens of Chinese taste, is the beautiful foreign settlement that has sprung up on the banks of the river to the east of the city. Merchant princes have reared for themselves, to occupy during a brief residence, edifices that may be justly termed palatial. First, on emerging from the east gate, the native finds himself in the French Reservation, which is gradually being filled up with buildings, forming a city under the jurisdiction of that power. On crossing a canal, he beholds a city apparently as large as his own—the English quarter; streets parallel with, and at right angles to the river, paved and well lighted, bearing English names, and faced with substantial stuccoed brick buildings, ornamented with colonnades, having garden space in front of each filled with choice flowers. He sees, at the rear of this marvellous city which has suddenly sprung up before his eyes, a race-course and a church—two things to be found wherever Englishmen congregate abroad. The river in front of the Chinese town is thronged with junks, lashed side by side for a couple of miles, the reach in front of the foreign settlement being crowded with square-rigged vessels, numbering sometimes above 100. Lower down are the ship-yards, machine-shops, and dry-docks, which foreign commerce has called into existence. Tugs are constantly steaming to and fro, towing ships and junks against the impetuous tides of the Yangtse. Under the arrangement by which the foreign custom-house dues are collected by foreigners, facilities have been created for the navigation by stationing a light-ship, buoys, and signals, rendering safer the approach to this important mart. There is also a system of foreign pilotage, giving additional security to the mariner. There are a chamber of commerce, reading-room, library, and literary institution—nothing being wanting to render the port of S. the metropolis of Eastern commerce. The municipal government of the foreign settlement is highly creditable to the mercantile traders. Three gentlemen, generally two English and one American, are elected annually by the holders of land, for the purposes of local government—police, public improvements, and repairs requiring much management, and entailing much expense, the funds for which are obtained by taxation. S. is also the seat of various missions for converting the natives, the schools, dispensaries, and other benevolent objects meeting with generous support from foreign merchants. The products of S. itself are not of much value, but the city is a most important entrepôt for goods passing between the north and south provinces of China, as well as for the imports and exports from and to foreign countries. The trade of the port increased threefold between the years 1860 and 1863; and this increase is due in a great measure to the large and increasing trade from the ports opened on the Yangtse in Chinese produce of all descriptions. In 1860, the entrances and clearances at the port were 1979 vessels of 597,722 tons; in 1863, 6947 vessels of 1,961,199 tons. In 1860, the imports amounted to £13,000,000; in 1863, they amounted to £29,709,575; and in the latter year, the exports and re-exports together amounted to about £30,000,000. The articles of import and export are of a most miscellaneous description; the chief articles (of import) being opium and treasure, and (of export) tea and silk. Great quantities of the opium and treasure imported into S. are re-exported to the other parts of China, to Japan, &c. The mercantile importance of S. promises to increase greatly through the opening of the Yangtse River to commerce. North China (Shanghai) *Herald*, and *Commercial Reports*, 1862—1864.

SHA'NNON, the largest of the rivers of Ireland, rises in the Culcagh Mountains, county of Cavan, and after a course of 220 miles, falls into the Atlantic Ocean between the headlands of Loop and Kerry Head. It is commonly divided into two portions, the Upper S. from its source to Limerick, and the Lower S. from Limerick to the sea, a distance of 56 miles. In its upper course it passes from its source in Cavan to Lough Allen in the county of Leitrim; thence through a difficult channel, where the navigation is in part transferred to a canal, to a small expansion called Corry Lough, and, with alternations of river and lake, to Lough Forbes, in the county of Longford, on leaving which the river for a time attains an average width of 250 yards as far as Lanesborough. Here it is again merged in a lake called Lough Ree, which stretches ten miles southwards to within two miles of Athlone. At this point great natural difficulties have been overcome, and the course of the river, by Shannon Harbour and Portumna, and through the picturesque Lough Derg to Killaloe, has been so deepened and improved that a regular passenger and goods traffic is maintained. From Killaloe to Limerick the navigation, owing to the rapid fall, is again in part transferred to a canal. On approaching Limerick the river divides into two branches, and on the island thus formed stands what is known as the Irish Town, in contradistinction to the English town, of Limerick. From the city, where an extensive and commodious range of quays has been built, to the sea, the S. is navigable to sea-going vessels; and although for a distance of eight or nine miles below the city it is very shallow at low water, the navigation for the last 40 miles is free and unimpeded at all times of the tide. The entrance between Kerry Head and Loop is seven miles across. About ten miles from the entrance the river narrows to about a mile and a half in width. At present, however, the most important part of the outward navigation commences at the harbour of Foynes, which is connected by railway with Limerick, and from which steam-boats daily ply to Kilrush, Tarbert, and the intermediate stations.

Several rivers of considerable size fall into the S. during its course, as the Suck, the Brosna, the Fergus, the Maigue, and the Feale. The improvement of this river has long been regarded a measure of national importance, and was commenced under the Irish parliament. In 1837, the work was placed under a board of commissioners, by whom a sum of more than half a million was expended. It has since been transferred to the Board of Works. The navigation is open from the head of Lough Allen to Limerick, a distance of 146 miles, over 129 of which large river steamers freely ply. Much dissatisfaction, however, is expressed by the proprietors and occupiers of the banks of the river at the very imperfect and, it is believed, faulty character of the provision for drainage and the prevention of overflow; and the subject is at present again under the consideration of the government and the legislature.

SHAN-SE' (West of the Hills), a province of North-Western China, is of rugged surface, and lies on the western limits of the plain. In the north are imperial hunting-grounds. It supplies the purest iron ore and the best coal in China, besides cinnabar, copper, marble, and other minerals.

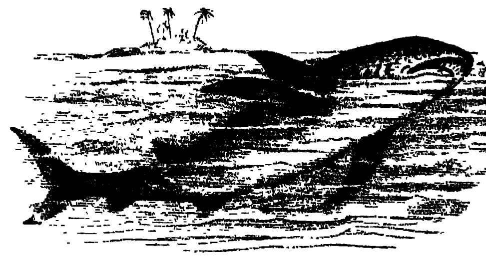
SHAN STATES, a number of tributary states in Indo-China, lying between Munnipur on the west and Yun-nan on the east, and from the parallel of 24° N. lat., south to Bankok and Cambodia. Of these the northern states are tributary to Burmah (q. v.) and the southern to Siam (q. v.). A great portion of the mountainous region of these states is called the Laos Country. The Laos races are divided into two curiously distinct subdivisions. The northern race, beyond the northern frontier of Siam, are called *Black-bellies*, from the circumstance that they tattoo themselves with figures in ink, printed on their bodies with sharp needle-like points; the southern race, mostly on and within the eastern frontier of Siam and tributary to that kingdom, are called *White-bellies*, and do not tattoo. Xieng Mai, the capital of Laos, stands on a wide plain on the right bank of the Meinam, 500 miles north of Bankok, and is said to contain 50,000 inhabitants. The number of Laocians included in Siam alone is estimated at 1,000,000. They are meek, gentle, unwarlike, and superstitious. Their chief employment is agriculture; and the principal crops raised by them are rice, maize, the sweet potato, calabashes, red pepper, melons, and other fruits. In religion they are Buddhists.

SHA'PINSHAY, one of the Orkney Islands, about 5 miles north-east of Kirkwall. It is 5 miles long and 4½ miles in extreme breadth. The fine natural harbour of Elwick Bay on the south side is overlooked by a pleasant modern village. Pop. (1861) 973.

SHARI (i. e., *river*), the principal feeder of Lake Tsad or Tchad (q. v.).

SHARK (*Squalus*), a Linnean genus of cartilaginous fishes, now forming in Müller's system a suborder of *Plagiostomi* (q. v.), and divided into a number of families and many genera. The sharks have generally an elongated form, tapering gradually to the tail, and not much thickened in the middle. The muzzle projects over the mouth; the nostrils are situated on the under-side of the muzzle. The males have claspers. The gill-openings are lateral. There is no cartilage between the snout and the pectoral fin, as in the rays. Some of the sharks are ovoviviparous; others lay eggs, generally a pair at a time, more being produced in succession. The eggs are large in comparison with those of osseous fishes, and are of a square or oblong form, with a tough horny coat, each corner prolonged into a tendril, the tendrils being apparently of use for their entanglement amongst sea-weeds. These eggs, or at least their empty cases, are very frequently cast up by the waves on the sea-beach, and are popularly known as *Sea Purses* or *Mermaids' Purses.* Near the head of the enclosed embryo there is a slit in the case through which water enters for respiration, and there is another at the opposite end, by which it is discharged. The young fish ruptures the case at the head, where it is weaker than at any other part, and on issuing from it, carries a yolk-bag attached to its belly for its nourishment until it is able to seek food. At this stage of its existence, its respiration is also aided by filaments projecting from the gills through the gill-openings, which are absorbed as it grows older. The teeth are generally large, sharp, and formed for cutting, with the edge often serrated; but in the genus *Cestracion* (q. v.) the teeth are pavement-like; and in some genera they are small and numerous. The Angel-fish (q. v.) is ranked among the sharks, but differs from the rest in its flattened form. Some of the smaller sharks are popularly known by the names Dogfish, Hound, Tope, &c. In the articles Cestracion, Dogfish, Fox Shark, Hammer-head, Porbeagle, and Tope, some of the S. tribe are noticed. It only remains here to notice a few of the more interesting of those which do not come under any of these heads.

The WHITE S. (*Carcharias vulgaris*) is the most dreaded of all the monsters of the deep. The family *Carcharidæ*, to which it belongs, have two dorsal fins, the first dorsal placed over the space between the pectoral and ventral fins; they have a nictitating membrane; and have no spout-holes. In the genus *Carcharias* the snout is flattened. The white S. attains a great size; one has been caught of 37 feet in length. The body is covered with a hard skin,



White Shark (*Carcharias vulgaris*).

and is grayish-brown above and whitish below. It is a very rare visitant of the British coasts, if indeed another species has not been mistaken for it; but is found in the Mediterranean, and is plentiful in the seas of many of the warmer parts of the world, often following ships to feed on any animal substance that may be thrown or may fall overboard, and often in its indiscriminate voracity swallowing things which are indigestible. A lady's work-box has been found in a S.'s stomach; and the papers of a slave-ship, which had been thrown overboard, in that of another. Human beings are not unfrequently its prey, and a large S. is not only capable of biting off the limb of a man, but of snapping the body in two, and has even been known to swallow a man entire. Its head is large, the mouth large and wide; furnished with a terrible apparatus of teeth, of which there are six rows in the upper jaw and four in the lower; the teeth are triangular, sometimes two inches in breadth, sharp-edged, and serrated; when not in use they are laid back in the mouth, nearly flat, but when the S. bites they are

brought up—or at least those of the outer rows—by means of muscles with which each tooth is independently provided. The tail, as in all the sharks, is heterocercal, but its lobes are more nearly equal than in most of them. The S. is often captured by sailors, by means of a great hook baited with a piece of meat, and attached to a chain, as the S.'s teeth readily bite through any rope. When the S. is hooked and hauled on board, great care is requisite to avoid danger both from the mouth and from the tail, the powerful action of the latter being generally interrupted by a sailor springing forward and cutting it above the fin with a hatchet. A curious method of catching the S. is practised in the South Sea Islands; a log of wood is set afloat with a strong rope attached to it, at the end of which is a noose, and the sharks gathering about it as if from curiosity, one of them may be expected soon to get its head into the noose, and is at last wearied out by the log. Formidable as the S. is, men have sometimes successfully braved it in its own element, watching its turning—as from the position of its mouth it must do—to seize its prey, and stabbing it in the belly.

The Blue S. (*Carcharias glaucus*) is much smaller than the White S., seldom exceeding eight feet in length. It is also of a more slender form. The upper parts are of a blue colour, the belly white. This species is common in the Mediterranean, and in the warmer parts of the Atlantic. It is not unfrequent on the south-western coasts of England in summer, apparently coming in pursuit of pilchards, and often doing great mischief to the nets and lines of fishermen, its sharp teeth biting through a net or line with the utmost ease.

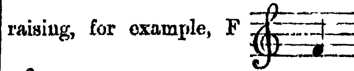
The Basking S. (*Selache maxima*) belongs to the family *Lamnidæ*, having two dorsal fins, spout-holes, and no nictitating membrane. The snout of the Basking S. is short and blunt; the teeth are small, numerous, conical, and curved backwards. The skin is much rougher than in the White S. and Blue Shark. This species attains a great size, being sometimes 36 feet long, but it is not so thick in proportion as the White Shark. It is of a blackish-brown colour, glossed with blue. It does not exhibit a ferocious character, and is supposed to feed on medusæ, crustaceans, and the like. It is often seen swimming slowly with its dorsal fin above the surface of the water, whence it has obtained the name of *Sail-fish*. It permits itself to be quite closely approached by a boat, but on being struck with a harpoon, it plunges suddenly down, and swims off with great rapidity, so that its capture is attended with danger. It is not uncommon on the northern and western coasts of Britain.

The Greenland S. (*Scymnus borealis*) is of the family *Scymnidæ*. It has large spout-holes, two dorsal fins, no anal fin, and no nictitating membrane. It inhabits the northern seas, and is rarely seen so far south as even the northern Scottish islands. It attains a length of 14 feet or more, is thick, and tapers suddenly at the tail; the fins very small; the teeth in both jaws so arranged as to diverge from a centre. It bites and annoys whales, but feeds also on small fishes and crustaceans. When a whale has been killed, a S. will often come even whilst men are occupied in cutting off the blubber, and scoop out one great lump after another, and will return to its repast after having been severely wounded.

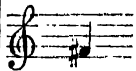
The rough skin of sharks is employed by joiners for polishing fine-grained wood, and for covering the hilts of swords to make them firmer in the grasp.—The flesh is coarse, but is sometimes eaten. The fins abound in gelatine, and are much used by the Chinese for making a rich gelatinous soup. Dried sharks' fins are a considerable article of import into China. The liver yields a large quantity of oil, which is now also, in some parts of the world, an article of commerce. For the sake of this oil a S. fishery is prosecuted on the coast of Ceylon.

Fossil Sharks make their first appearance in the Oolitic rocks from which eight species have been described. They become more numerous in the Cretaceous deposits, in which no less than 60 species have been found. In the Tertiary strata, their remains are still more abundant. But as the determination of fossil species depends entirely on the teeth, which, with the exception of the spines and vertebræ, are the only portions preserved, it is probable that the species and genera are too greatly multiplied.

SHARP, a sign ♯ in Music, which, when prefixed to a note, elevates it by a semitone in the scale, raising, for example, F



to F sharp



When placed at the beginning of a piece of music, it denotes that all the notes on the line or space on which it is placed, and their octaves above and below, are to be played sharp. A double sharp x raises a note two semitones.

SHARP, James, Archbishop of St Andrews, was the son of William Sharp, sheriff-clerk of Banffshire, and was born in the castle of Banff, May 1618. Educated for the church at the University of Aberdeen, where he attained distinction as a student, and where he is said (on the authority of a tract, entitled *A True and Impartial Account of the Life of the Most Reverend Father in God, Dr James Sharp, Archbishop of St Andrews*, published in 1719) to have protested against the 'Solemn League and Covenant;' he afterwards visited England, and became acquainted with several eminent English divines, such as Hammond, Sanderson, and Taylor. Returning to Scotland, he was appointed a professor of philosophy at St Andrews, through the influence of the Earl of Rothes, and soon after minister of the parish of Crail, an office which he held during the ascendency of Cromwell. In August 1651, when Monk was reducing Scotland to obedience, he was carried off, along with several other ministers, to England. S. quickly regained his liberty, and he possessed, for some years, the confidence of the more moderate party in the church. In 1656, he was chosen by them to plead their cause in London before the Protector, against the Rev. James Guthrie, a leader of the extreme section (the Protestors or Remonstrators), which he did with so much dexterity, that Cromwell is reported to have said: 'That gentleman, after the Scotch way, ought to be termed Sharp of that Ilk.' When the Restoration was on the eve of happening, S. was appointed by the moderate party to act as its representative in the negotiations opened up with Monk and the king. This is the crucial period of his career, and on the view we take of his motives depends our whole estimate of his character. Was he sincere, or did he mean to betray the church to which he owed allegiance? Presbyterian writers are nearly unanimous in affirming his perfidy, although the evidence is doubtful. Among the first things the Scottish parliament that met 1st January 1661 did, was to repeal or rescind every act passed since 1638, in consequence of which Episcopacy remained the Church of Scotland, as 'settled by law'—a dishonourable evasion of a promise made by Charles in a letter written to the Presbytery of Edinburgh

in August 1660. Soon after, at a council held in Whitehall, S. was nominated Archbishop of St Andrews, and having gone up to London, he was there formally consecrated by the Bishop of London and three other prelates. His government of the Scottish church was tyrannical and oppressive; and in consequence he became an object of hatred to most of his countrymen. When one Mitchell, a conventicle preacher, fired a pistol at him in the streets of Edinburgh, the populace allowed the intending assassin to walk quietly off, without making a single effort to arrest him. Finally, S. was assassinated on Magus Moor, near St Andrews, 3d May 1679, by a band of fanatical Covenanters. In defence of S., the utmost that can be said is, that he was simply an ambitious ecclesiastic (of plausible and courtly manners), who had no belief in the 'divine right' of Presbytery, and who thought that if England were resolved to remain Episcopalian, it would be very much better if Scotland were to adopt the same form of church-government, and that if there must be an Archbishop of St Andrews, there was no reason why he should not be the person. This theory is certainly a more sober one than the usual melodramatic Covenanting view, which makes him out to be 'a conscious villain,' who persecuted his old friends the more fiercely that he knew they were in the *right* and he in the *wrong*.

SHA'RPSHOOTERS, an old term applied in the army to riflemen. It is now appropriated to naval use, to the men stationed in the top to annoy those on the deck of an enemy's vessel.

SHÂSTRA or **SHÂSTER**, but more correctly written S'ÂSTRA (from the Sanscrit *s'ds*, to teach), means literally a book; but the term is especially applied to the *authoritative*, religious and legal, books of the Hindus. See SANSCRIT LITERATURE.

SHAT-EL-ARAB. See EUPHRATES.

SHAVE-GRASS. See EQUISETUM.

SHAWL-MANUFACTURE. Perhaps no garment is of higher antiquity than the shawl; indeed, its simplicity of form would lead us to infer that it was the earliest in use. But of its manufacture we have no distinct account until the reign of the Emperor Jelal-ed-din-Mohammed Akbar, in 1556, when the celebrated Cashmere shawls were amongst the most important manufactures of the world, and were thought worthy to be minutely described in the *Ayin-i-Akbari*, or the 'Institutes of the Emperor;' in that work, four distinct classes of shawls, all of goat's wool, are described. The 1st were of remarkable lightness and softness, and were usually self-coloured, and made of the wool undyed; the 2d were woven of wool in the natural colours—viz., white, black, and gray—these were probably arranged so as to form a plaid pattern similar to the shepherd's plaid of Scotland, which is of oriental origin; the 3d were called *gold-leaved*, probably from being embroidered with that material; and the 4th were long shawl-pieces large enough to enwrap the whole body. So carefully was this manufacture fostered, that it received the chief attention of the emperor, and every shawl manufactured was carefully described and registered, and the number of manufacturers was so great that in Lahore alone it is stated there were upwards of 1000. The manufacture, in later times, passed through many vicissitudes, and during last century, it declined greatly; but in 1809, it had again risen, and there were then about 16,000 looms at work. From 4000 to 5000 of these beautiful fabrics are annually imported into Great Britain; but the admirable imitations now produced by our Paisley manufacturers, and by the French, are exerting great influence over the trade. The true Cashmere shawls are woven in many pieces, and joined together with great artistic skill; those of Britain and France are, however, woven in one piece, the loom being worked by hand, and of course furnished with a Jacquard machine for the production of the pattern. Besides the Cashmere shawls and their European imitations, there is an infinite variety of shawls made of various materials—as silk plain, embroidered, and in the form of crape; thread, cotton, and silk lace; and wool in a great variety of styles.

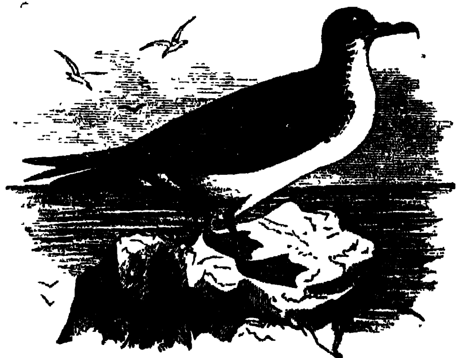
SHEA. See BASSIA.

SHEA'RING-MACHINE, a machine used in the preparation of woven woollen fabrics. See WOOLLEN MANUFACTURES.

SHEARS of various kinds are amongst the implements used in gardening. They are scissors on a large scale, variously modified to suit their various purposes, such as pruning trees, hedges, box-edgings, the verges of grass plots, &c. They are often furnished with long wooden handles, and a spring is sometimes fixed between the handles. A kind used for removing small branches of fruit-trees has one blade made to slide along the other whilst they are brought together, so that it makes a cut as clean and smooth as that of a knife.

SHEAR-STEEL. See IRON.

SHEA'RWATER (*Puffinus*), a genus of *Procellaridæ* (see PETREL), differing from petrels in having the tip of the lower mandible curved downwards, and the nostrils opening separately and not by a common tube. The bill is as long as the head, or longer, the upper mandible compressed and curved at the point. The legs are of moderate length, the tarsi compressed, the hind-toe rudimentary. The wings are long and pointed. The shearwaters spend their lives mostly on the ocean, rarely visiting the shore except for the purpose of incubation.—The GREATER, WANDERING, or CINEREOUS S. (*P. cinereus* or *major*) is about 18 inches long, the upper parts blackish-brown; the throat, breast, and belly gray. Young birds are entirely brown, the upper parts darkest. This species is frequently seen on the south-western coasts of Britain. It is very abundant on those of Newfoundland.—The MANX S. (*P. Anglorum*) is much more common on the British coasts, and is found also in more northern regions. It is about 14 inches long, grayish-black, the neck mottled with gray, the throat and all the under parts white. It breeds on islets, in rabbit-burrows, or in crevices of the rocks.—There are several other species in warmer climates.—The name S. is sometimes also given to the Skimmers.



Manx Shearwater (*Puffinus Anglorum*).

SHEATH-BILL (*Chionis*), a genus of birds of the family *Chionidæ*, placed by many naturalists among the *Grallæ*, but by others regarded as belonging to the *Gallinaceous* order, and ranked by Mr Swainson among *Columbidæ*. The legs are stout and moderately long, the toes much resemble those of the common fowl, but the fore-toes are united at the base. The bill is thick and conical, and the base is covered by a horny sheath, which the bird has the power of raising and depressing. The WHITE S. (*C. alba*) inhabits the shores of Australia, New Zealand, and neighbouring islands, and feeds on molluscs, crustaceans, and whatever animal substance is thrown up by the waves. It is about the size of a partridge.

SHEATHING is a protection for the wooden planking of the immersed portion of a ship from the attacks of the teredo and other worms, molluscs, and marine animals, which, especially in hot climates, adhere to the bottom and eat into the timber, while they retard the vessel's progress. As early as the time of Trajan, sheets of lead were used as sheathing. Thin deal boards, about half an inch thick, were in more modern times nailed on and frequently changed; but about the commencement of the present century, plates of copper were introduced, which have been found most effectual, though expensive. The gradual oxidation of the copper by the action of the sea-water produces a sort of poison, which prevents any marine animal from adhering, and keeps a clean bottom. The copper, however, slowly wears away in this oxidation, and requires renewing after a few years. To prevent this loss various methods have been devised. Sir H. Davy applied what he called protectors, consisting of pieces of iron and zinc on different parts of the *copper;* the action of the water on the two metals produced a small galvanic current, which prevented the copper from oxidising; but it became forthwith encased in barnacles and weeds. For ships stationary in harbour, as hulks, ships-in-ordinary, &c., this system of protection answers well; but it fails for sea-going vessels, together with many other protecting mixtures which have been tried, from the fact that in proportion as the copper is saved from oxidation, by so much does it cease to repel the incrustations which always threaten it.

SHEAVE. See PULLEY.

SHE'BA. See SABÆANS.

SHEBOY'GAN, a town and port of Wisconsin, U. S., on the west bank of Lake Michigan, at the mouth of the Sheboygan River, 60 miles north of Milwaukee. It was settled in 1836, has a good harbour, with mills at Sheboygan Falls, 6 miles above, and a large trade in wheat and timber. Pop. about 5000.

SHECHI'NAH (from *shachan*, to reside, rest), a word used in post-biblical times by the Jews, and adopted by early Christian writers: expressive of the presence of the Divine Majesty, in Heaven, among the people of Israel, or in the Sanctuary. It is first found used in the Chaldee versions (Targums) as a kind of periphrasis for the person of God, wherever it is mentioned in the Bible as corporeal: thus being a kind of spiritual interpretation of anthropomorphism. The S. is not supposed to have dwelt in the second temple, but it is to return with the Messiah. The particular place where the S. was supposed to dwell was the 'mercy-seat between the cherubim.' The cherubim or other angels were always more or less connected with the S. itself, as in the phrases 'the heavenly hosts,' 'hosts of saints,' &c., accompanying the Divine presence. The first mention of the word is found in the Targum Jerushalmi, Gen. iii. 24—'And He expelled Adam, and caused to reside the splendour of his Shechinah from the beginning at the east of the garden of Eden, above the two cherubim.' (Second recension: 'between the two cherubim.') Another characteristic instance of its use is found in the version of Onkelos, Deut. iii. 24—'Thou art God, Thy divine Shechinah is in Heaven above, and rules on earth below.'

SHEEP (*Ovis*), a genus of ruminant quadrupeds of the family *Capridæ*, so nearly allied to goats that the propriety of generic distinction is very doubtful. They differ from goats in having the outline of the face more or less arched and convex; the horns spiral, sometimes very large in the males—in domestication, however, often wanting in the females, and also in the males of some breeds; the chin destitute of a beard; a sac or pit between the toes of each foot, lined with hair, and secreting a fatty matter. It is supposed by some that all the wild sheep existing in different parts of the world are mere varieties of one species, but of this there is no sufficient proof, nor is there anything more than unsupported conjecture in any of the opinions advanced concerning the origin of the domestic sheep, such, for example, as that which refers it to the Moufflon (q. v.), or that which ascribes different domesticated breeds to different wild originals, as the Moufflon and the Argali (q. v.). In opposition to all such conjectures, it has been remarked that the tail of all the known wild sheep is very short, whereas that of the common sheep, if not mutilated by the shepherd, almost reaches the ground, and there is no known instance of the tail of any kind of quadruped becoming longer by domestication. It is not impossible that the common sheep may still exist, in a wild state, as yet unknown to naturalists, in the little explored regions of Central Asia.

All the wild sheep known are natives either of mountainous regions or of dry and elevated tablelands. They are gregarious, a character which the domesticated sheep fully retains. They are generally seen in small flocks, and are not easily approached, taking refuge in flight, a sharp whistling sound, emitted by one of the rams, serving as an alarm to the whole flock; although they are very capable of making a vigorous defence when driven to close combat. A ram of the domestic species is, indeed, able to sustain a conflict with a bull, taking advantage of his far greater agility, and butting against his foe with his strongly armed forehead. A ram has been known to throw a bull on the ground at the first onset, and is always ready to defend himself and his companions against a dog. Many rams exhibit great pugnacity, and the timidity often ascribed to sheep is chiefly to be seen in the ewes of the hornless breeds. Sheep differ from goats in their mode of fighting. Goats rear themselves on their hind-legs, and throw themselves sideways on their adversary, to bring the points of their horns to bear; sheep rush straight at him, a mode which better suits the different style of armature of the head.

All the wild sheep have short wool, with an outer clothing of long and nearly straight hair. But even the long hair—at least on the Moufflon—has the peculiar character of wool, in that roughness of surface which gives it the property of *felting* (see HAIR and FELT). One effect of domestication in the common sheep has been to cause the disappearance of the outer long hair, and to produce instead an increase of the length and abundance of the wool, an object of great importance to the sheep-farmer. In neglected breeds of the common sheep, the two kinds of hair or wool are very apparent. In some tropical climates, the sheep loses its abundant fleece,

and is covered with hair little longer than that of the ox.

Although not equal to goats in their adaptation to rocky steeps, and not endowed with such power of leaping from crag to crag, sheep exhibit a strong disposition to seek their food in places where no animal not very agile and sure-footed could venture; and those of the domesticated breeds which retain most of their original wildness are thus adapted to situations in which otherwise the pasture would be of no value to man. Every one who has seen the lambs frisking on a Highland hill, must have admired their nimble movements in places where a herd-boy could with difficulty scramble. In fine weather, sheep ascend the heights; and in cold and stormy weather, they repair to the lower grounds.

Of the wild sheep, two species, the Argali and the Moufflon or Musmon, have been already separately noticed. Another very interesting species is the ROCKY MOUNTAIN SHEEP, or BIG-HORN (*O. montana*) of North America, the only indigenous American



Rocky Mountain Sheep.

representative of this genus. It is equal in size to the argali, which it much resembles also in its general appearance, and in the size and curvature of its horns. The horns of the old rams attain so great a size, and are so much curved downwards and forwards, that they effectually prevent the animal from feeding on level ground. The abode of this species is in the most craggy and inaccessible parts of the Rocky Mountains. The flesh is of the very finest quality. The wool is very fine, and fully an inch and a half long; it is completely concealed by long hairs. The general colour is brown, paler on the lower parts; the old rams are almost white in spring. No attempt seems yet to have been made to domesticate the Rocky Mountain Sheep, although Professor Jamieson of Edinburgh recommended its introduction into Britain in 1818.—The AOUDAD (*O. tragelaphus*) is a native of the north of Africa, inhabiting chiefly the lofty parts of the Atlas Mountains. It is sometimes called the Bearded Argali, although it has no beard on the chin; but the throat, the chest, and the front of the forelegs are remarkably adorned with long shaggy hair. On other parts the hair is comparatively short, with an underclothing of short wool. The colour is a uniform reddish-yellow. The tail is longer than in the other wild species, and is terminated by a kind of tuft of long hairs. The horns are not so large as in the other wild species. In size, the Aoudad exceeds the Moufflon, but is not equal to the Argali. The French call it *Moufflon a manchettes*, or Ruffled Moufflon, from the long hair of its forelegs.

The COMMON SHEEP (*O. aries*) was probably the first animal domesticated by man. We are told in the book of Genesis that Abel was 'a keeper of sheep,' and that he brought an offering unto the Lord 'of the firstlings of his flock and of the fat thereof.' And from that time until the death of Christ, lambs continued to be the most frequent sacrificial offerings, both amongst the patriarchs and the Jews. The felting and weaving of wool were unquestionably among the earliest of the arts. The wool was probably at first pulled from the skin, a rude and even cruel practice, which still subsists in some countries, and was not long ago relinquished in the Orkney Islands; but we read in Genesis xxxviii. of Judah shearing his sheep, and there is abundance of other evidence that this better mode of obtaining the fleece has been in use from remote antiquity. Almost every part of the sheep is useful, and is employed for purposes similar to those of corresponding parts of the ox. The leather made of the skin is much employed in bookbinding, and for making gloves. In patriarchal times, the milk was much used, as it still is in some countries; it is richer than cow's milk, and the cheese made of it has a sharp taste and strong flavour, which, however, are greatly relished by some. In Britain, except in the mountainous parts of Scotland and in Wales, the milk of the sheep is now scarcely regarded, and cheese is almost never made from it. In some mountainous parts of India the sheep is even used as a beast of burden, carrying loads of from 35 to 40 pounds, over rough tracks, and up steep crags, where almost no other animal could be employed.

The sheep is not generally reputed to possess much intelligence; but those who watch sheep carefully, or keep them as pets, find them very far from being devoid of it. Their reputation of stupidity seems to be very much founded on their habit of following, without scruple, the leader of the flock; so that when sheep are being driven across a narrow bridge, or where a fence separates the road from a precipice, if anything occur to deter them from proceeding in the proper path, and one break over the fence or parapet, the whole flock may be expected to follow, as has sometimes happened, to their utter destruction. Of this instinct, the shepherds of the East have taken advantage, bestowing special care upon the leaders of the flock, which follow readily on their call, and the whole flock is thus under the shepherd's command. The allusions in the sacred Scriptures to the flock following the shepherd, and the shepherd calling his sheep by name, are as appropriate to the customs of the East at the present day as in the times when they were written. The management of sheep in Britain and other western countries is of an entirely different character.

The sheep generally brings forth one lamb at a birth, frequently two; sometimes three, and rarely four or five. The lambing season is when spring is so far advanced that the young lambs are safe from the cold and storms of winter. The care of the sheep-farmer, however, modifies the course of nature, when his object is to send lambs to market at an earlier season than would be possible if the sheep were left without shelter or other food than the natural pasture. The lamb is suckled for nearly three months, and at the end of this time the annual sheep-shearing takes place.

The ancient Britons seem to have possessed sheep before the Roman invasion. During the period of Roman dominion, Britain became famous for the production of wool, and British woollen goods were much valued in Rome. Winchester early became the great seat of the woollen manufacture, and continued to be so for centuries. The great object of sheep-farming in Britain at this time was the production

of wool. The demand for butcher-meat has now raised the value of mutton and lamb so much, that the farmer finds it profitable to devote much of his attention to the supply of the market with these articles; and those breeds of sheep are reckoned most valuable which are most suitable for this purpose, even although the fineness of the wool is inferior to what might be obtained if it were the one great object of regard, and to what is imported from distant parts of the world. The quantity of the wool, and the length of its fibres, however, compensate in a great measure for its inferior fineness. Wool is the chief object of the Australian sheep-farmer, and the introduction of the Merino Sheep has been of great importance in the improvement of its quality. When there was no food for sheep but the natural pasture, sheep could not be fattened for the market except during summer, and not until they had attained an age of three, four, or five years, whereas much of the mutton now consumed is the flesh of sheep not more than two years old; the sheep being fattened by the aid of turnips, mangold, oil-cake, &c. If the quality of the mutton is not quite equal to that of older sheep, the supply is much greater, as well as the profit to the farmer. In weight and fatness, the sheep of the best breeds far exceed anything known until recent times.

The young branches of heath, and in lower situations, the shoots of furze, often serve as food for sheep, when the supply of grass fails. Sheep delight in the short grass and peculiar herbage of hill pastures and bare downs; and the mutton produced in such pastures, and by the breeds most suitable to them, is of superior quality to that of the large fat sheep fed on richer soils. The latter are also more liable to many diseases, particularly where the ground is at all moist. Aromatic and bitter herbs are particularly relished by sheep.

The breeds of sheep are very numerous, and very different. The valuable Merino (q. v.) Sheep has been already noticed.—The BLACK-FACED SHEEP of the Highlands of Scotland and of the north of



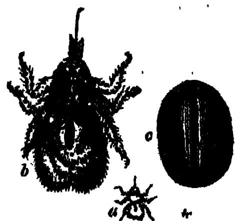
Black-faced Ewe and Ram.

England, is perhaps as near the original type as any existing breed. Both male and female have horns; those of the ram large, with two or more spiral twists, those of the ewe much smaller, and little twisted. The face and legs are black. The Black-faced Sheep is robust, very active, and hardy; enduring the rigours of a severe winter when sheep of most of the breeds common in Britain would perish. It has a bright, quick eye, with an expression very different from that softness which is seen in many of the breeds preferred for lower grounds and better pastures. The wool is long and coarse, and the weight of the fleece not great; but the mutton is of the finest quality; and on this account, and its hardiness, this breed is preferred to any other in many mountainous districts and on rough elevated moors.—The WELSH SHEEP is much smaller than the Black-faced; both sexes horned; the colour various; the mutton highly esteemed; the fleece seldom weighs two pounds.—A similar small breed, with shorter and remarkably broad tail, hornless, or with short and little twisted horns, has long existed in the Shetland and Orkney Islands; its wool affording the material for the manufacture of Shetland hose. The Shetland and Orkney sheep are very hardy, and in winter feed much on seaweed.—Smaller than either of these, and, indeed, remarkably diminutive, is the hornless BRETON SHEEP.—The FOREST SHEEP of England, so called from being pastured in the royal forests, has now in most places been supplanted by other breeds. They are still to be seen on the barren grounds between the British and Bristol Channels; and the mutton is in much request in the London market. The original Forest Sheep was generally small, with face and legs russet brown or gray, wild, restless, and difficult to fatten, but producing wool of fine quality.—The DORSET SHEEP is one of the best of the old English upland breeds. Both sexes have small horns. The wool and mutton are of medium quality; but the ewes are remarkable for their fecundity, and the abundance of their milk; and this breed is valued as affording a supply of early lamb for the London market.—The RYELAND SHEEP has long existed in Herefordshire and some neighbouring counties of England. It is small, short-limbed, white, hornless; produces excellent mutton; and before the introduction of Merino wool, its wool was preferred to every other kind for the manufacture of the finest broadcloths.—The CHEVIOT SHEEP has existed from time immemorial on the Cheviot Hills, and is now very widely diffused over a considerable part of England and almost all parts of Scotland, being hardy and well adapted for high grounds, although it is inferior in hardiness to the Black-faced, which has been restored to its place, after the losses experienced in severe winters, on many of the highest and coldest farms where the Cheviot had for a time supplanted it. The Cheviot greatly excels it both in size and in the value of the fleece; but requires a richer pasture. Both sexes are hornless. The general figure is longer than that of the Black-faced sheep. The colour is white, the face and legs occasionally mottled with gray. The fleece weighs from three to four pounds. Great attention has for many years been devoted to the improvement of this breed.—The LEICESTER SHEEP is another of the most valuable breeds. This breed, as it now exists, is a result of the skill and care of Mr Bakewell, who, soon after the middle of last century, began to make experiments for the improvement of the old Leicester sheep—a large, coarse-boned sheep, not easily fattened, and with coarse long wool, of which, however, the fleece weighed about ten pounds. The new Leicester sheep has wool moderately long, of better quality, the average weight of the fleece about seven or eight pounds; and is easily rendered very fat. The colour is white. Both sexes are hornless. The Leicester sheep is now common in all but the mountainous parts of Britain, and other breeds have been improved by crossing with it, particularly various breeds of long-woolled sheep, which have long existed in different parts of England, as those of Lincolnshire, Romney Marsh, &c.—A famous long-woolled breed is that called the COTSWOLD OR GLOUCESTER, the wool of which was in great esteem in the 14th and 15th centuries,

bearing a higher price than any other wool. In 1464, Edward IV. sent a present of Cotswold rams to Henry of Castile; and in 1468 a similar present was sent to John of Aragon. The Cotswold breed, however, as it at present exists, has been modified by crossing with the Leicester, and produces shorter wool and better mutton than in former times.—The SOUTH DOWN SHEEP is the only other British breed that requires special notice for its importance to the farmer. It has recently been improved with the utmost care. The colour is generally white, but black is not rare; and the face and legs are generally dun, black, or speckled. Both sexes are hornless. The wool is short, close, and curled. The South Down derives its origin and name from the chalky *downs* of the south of England; but is now common throughout England and the south of Scotland. It is not suited to very cold and exposed situations.

The ICELAND SHEEP is remarkable for very frequently having three, four, or five horns. The same peculiarity, or monstrosity, as it may be deemed, is exhibited by the sheep of some of the most northern parts of Russia. The Iceland sheep has a double covering of long and short wool. Its flesh is of the very finest quality.—The north of Africa possesses a breed of sheep with legs of great length, pendulous ears, and much arched face; the wool short and curled, except on the neck and shoulders, which have a kind of mane.—India has also a hornless breed, with pendulous ears, short tail, and very fine much curled wool.—The BROAD-TAILED or FAT-TAILED SHEEP is found in many parts of Asia, as in Syria, India, and China, also in Barbary, and is now very abundant in the colony of the Cape of Good Hope. It is rather of small size, with soft and short wool. Its chief characteristic is the enormous development of the tail, by the accumulation of a mass of fat on each side, so great that the tail has been known to weigh 70 or 80 pounds. The tail is highly esteemed as a delicacy, and to protect it from being injured by dragging on the ground, the shepherd sometimes attaches a board to it, or even a small carriage with wheels. The fat of the tail is often used instead of butter. It is less solid than other fat.—The FAT-RUMPED SHEEP of Southern Tartary has a similar accumulation of fat on the rump, falling down in two great masses behind, and often entirely concealing the short tail.—The ASTRAKHAN or BUCHARIAN SHEEP has the wool twisted in spiral curls, and of very fine quality. The lamb skins, so much in request amongst furriers, are in great part produced by this breed; but partly also by the CIRCASSIAN SHEEP, which is reared on Mount Caucasus and adjoining regions, where the shepherds sew up the lambs as soon as they are born in bandages of coarse linen, and pour warm water over them every day, to make the wool soft and sleek, and to lay it in glossy ringlets, the bandage being gradually let out to suit the increasing size of the animal. This fur is much used for lining dresses. The Circassian sheep has a remarkably long tail, covered with fine long wool, which trails on the ground.—The WALLACHIAN SHEEP, common in Hungary, as well as in the country from which it derives its name, is distinguished by the magnitude of its horns, and their direction. They make one great spiral turn, and then generally rise up from the head to a great height, twisting round as they rise. The wool is soft, and is concealed by long hair.

SHEEP-LOUSE, or **SHEEP-TICK**, or (in Scotland) KAID (*Melophagus ovinus*), an insect of the family *Hippoboscidæ*, to which also the Forest Fly belongs, ranked in the order *Diptera*, although in this genus the wings are completely wanting. It lives among the wool of sheep, and particularly of lambs, sucking the blood of the animal, and is most abundant in the early part of summer. Where it fixes its head in the skin, a large round tumour is formed. Its body is very compressed and smooth, of a rusty colour, the head and thorax small, the abdomen large. The female does not lay eggs, but, like the other *Hippoboscidæ*, hatches the egg and nourishes the larva within her own body, till it passes into the pupa state, when it is deposited, oval-shaped and shining, fastened to the wool of the sheep. Sheep-farmers use various washes or *dips* for the destruction of these creatures, many of which are arsenical. A patent was obtained a few years since for a sheep-dip, of which Carbolic Acid is a principal ingredient.



Sheep-louse (*Melophagus ovinus*):
a, natural size; b, magnified; c, the pupa, magnified.

SHEEP'S-HEAD (*Sargus ovis*), a fish of the family *Sparidæ*, plentiful in the latter part of summer on some parts of the coast of North America, and highly esteemed for the table. It sometimes attains a weight of 14 or 15 pounds. A very large fish is sometimes sold in the New York market for a price equal to four or five pounds sterling. The fishery is therefore of some importance. Nets are used, and many fish are often taken at a single haul, which are immediately packed in ice for the market. It is difficult to take the S. with a line, as its cutting teeth snap the line asunder. The genus *Sargus* has cutting front teeth, and round teeth in the back of the mouth. *S. Rondeletii* inhabits the Mediterranean, and has been esteemed for the table from ancient times. The *Sargi* feed on shell-fish and the smaller crustaceans, which they easily crush with their round teeth; partly also on sea-weeds.

SHEEP-STEALING, in England, is felony, and is punishable with penal servitude from three to fourteen years, or imprisonment for two years. In Scotland, it is a capital offence, though, for some time, it has never been punished capitally.

SHEERNE'SS, a seaport and naval arsenal in the county of Kent, stands on the north-west extremity of the Isle of Sheppey, at the confluence of the Thames and Medway, 11 miles east-north-east of Chatham. It consists of four divisions, Blue-Town, Mile-Town, Marine-Town, and Westminster, and of these the first is within the limits of the garrison. The dockyard, much extended and improved within recent years, is now one of the finest in Europe. It covers 60 acres, comprising wet and dry docks, immense storehouses, and official residences. The harbour is usually crowded with vessels of all descriptions. An extensive oyster-fishery is carried on in the vicinity, from which as many as 50,000 bushels of 'natives' have been sent to London in one season. At Garrison Point is the residence of the port-admiral, the telegraph, coast-guard station, and barracks. The chief trade is in supplying the requirements of the employees in the various government establishments, and in the export of corn seeds and oysters. The neighbourhood was once thought to be very unhealthy, but of late years important sanitary works have been carried out, and there are now few towns the population of which enjoy better health. Since the provision of direct railway communication with all parts of England, the town is much visited during the summer on account of the excellent sea-

bathing there, which is under the management of a local joint-stock company. The beach and cliffs are a favourite resort for ramblers. Pop. (1861) 12,015. S. was captured by the Dutch under De Ruyter in 1667, and here the mutiny of the Nore burst forth in 1798.

SHEERS. The elemental form of a pair of sheers consists in two spars fastened together near the top, with a pulley at the point of junction, and held by a rope, fastened to any convenient object, in such a position that the weight lifted hangs nearly between the spars. This forms an easily improvised crane. An apparatus of this kind, of great height and strength, is used for masting vessels. In the principal dockyards, there are tall permanent sheers, mounted either on the side of a masting-dock or on a floating sheer-hulk.

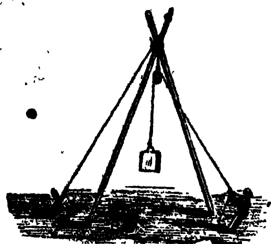


Fig. 1.

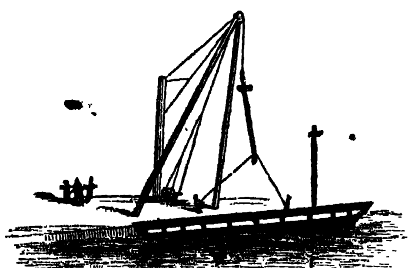


Fig. 2.

SHEET, on Shipboard, is the rope by which each of the lower corners of a square-sail, or the after-corner of a fore-and-aft sail, is held down, in order that the sail may be tightened to the wind.

SHEETING, a cloth made of flax or cotton, and used for bed-linen. It is chiefly made in Ireland in or near Belfast, and in Scotland. The term sheeting is also applied to the coarse hempen cloth used for making Tarpaulings (q. v.).

SHE'FFIELD, an important manufacturing town and parliamentary borough, in the West Riding of Yorkshire, and capital of an independent district, called Hallamshire (see SHIRE); it is picturesquely situated on several hills that slope towards the confluence of the rivers Sheaf and Don, 162¼ miles north-north-west of London by the Great Northern Railway, and 50 miles south-south-west of York. The town, generally, is well built, although, on account of the smoke with which it is enveloped, it presents a dingy appearance as contrasted with the surrounding beautiful scenery. It possesses many fine public buildings, such as the original parish church, supposed to have been erected in the reign of Henry I., 240 feet long by 130 feet broad, with a central tower surmounted by a lofty spire; St Mary's Catholic Church, surmounted by a tower 200 feet high; the town-hall, cutlers' hall, corn exchange; the new market-hall, or Norfolk Market, with a roof of glass and iron, erected by the Duke of Norfolk at a cost of about £40,000; music-hall, assembly rooms, theatres, &c. There are extensive botanic gardens, and a fine cemetery about a mile from the town. There are 25 churches belonging to the establishment, each of which represents a separate parochial district; 3 Roman Catholic churches; and a great many other places of worship belonging to the Methodists, Baptists, Independents, and other dissenting bodies. There are monuments to Ebenezer Elliot, James Montgomery, and the soldiers belonging to S. who died in the Crimea. There are numerous educational establishments, such as the Free Grammar School, the Collegiate School, the Wesley College, a Lancasterian and many national schools, free writing-schools, school of art, besides denominational schools, &c.; also a Mechanics' Institution, established in 1832. The Mechanics' Library (1828) is now merged into the Free Library, which contains upwards of 11,000 vols. There are likewise many charitable institutions.

As far back as the time of Chaucer, S. was noted for the manufacture of cutlery; and at the present day, an endless variety of articles in brass, iron, and steel, is produced at the many manufactories with which the town abounds; such as knives of every description, silver and plated articles, Britannia metal goods, coach-springs, spades, spindles, hammers, files, saws, boilers, stoves, grates, buttons, &c. Amongst the new branches of trade are electro-plating in gold and silver, and the manufacture of iron plates for the armour-plating of ships-of-war, which are extensively produced by several manufactories. The conversion of iron into steel by both the old and new processes is one of the largest and most lucrative branches of the trade of Sheffield. Steam-power is extensively employed. The river Don, which is navigable up to within 3 miles of the town, and the canal in connection with it, along with several important lines of railway communicating with the town, afford ample means of developing and improving the resources of Sheffield. Coal abounds in the neighbourhood. The borough was incorporated in 1843, and returns two members to parliament, the pop. in 1865 being 207,579. Of Sheffield Castle, nothing now remains. Mary Queen of Scots was imprisoned in Sheffield Manor House, about two miles from the town, for 12 or 14 years.

SHEIK (Arab., elder, aged person), a title of reverence, applied chiefly to a learned man, or a reputed saint, but also used sometimes as an ordinary title of respect, like the European Mr, Herr, &c. before the name. It is, however, only given to a Moslem. The Sheikh Al-Islam is the chief Mufti (q. v.) of Mohammedanism at Constantinople: a title supposed to have been first assumed by Mohammed II. at his conquest of Constantinople in 1453, when this place became the seat of his empire. The Sheikh of Mecca, by virtue of his supposed descent from the prophet, levies a kind of tribute on all the pilgrims to the Kaaba. The term is also applied to heads of Mohammedan monasteries (our abbot or prior), and to the higher order of religious preachers. Sheikh Al-Gebal (Ancient of the Mountain) is the name of the prince of the Assassins (q. v.), or those Ismaelites of Irak, who undertook to assassinate all those whom their chief would pronounce to be his enemies.

SHE'KEL (*siklos*, from *shakal*, to weigh), originally a certain standard weight in use among the ancient Hebrews, by which the value of metals, metal vessels, and other things was fixed. Gradually it became a normal piece of money, both in gold and silver, marked in some way or other as a coin, although not stamped. The gifts to the sanctuary, the fines, the taxes, the prices of merchandise, are all reckoned in the Old Testament by the shekel, not counted but weighed. Three different

kinds of gold, silver, and copper shekels are mentioned: the common shekel, the shekel of the sanctuary (probably of double value), and the shekel of royal weight. Besides these, there was a half-shekel (*beka*), and a fourth-shekel. The sacred shekel was equal to 20 geras (beans), and 3000 sacred shekels made a talent. The gold shekel is reckoned approximatively to contain 161 Troy grains, the silver shekel 275. During the Babylonian exile, the Persian money (*dariks*) was used by the captives; nor do they seem to have afterwards used any but the coin of their foreign rulers. It was first under the Maccabæans that national money began to be struck, adorned with sacred emblems, and with inscriptions in the native language and characters. De Saulcy alone assumes, without much show of reason, Jewish coins to have existed from the time of Alexander the Great. Simon, the 'prince and high-priest,' received, according to 1 Macc. xv. 16, the permission from Antiochus VII. to strike coin in 138 B.C. The emblems are sacred branches, sheaves, flowers, vases, &c., and the legend (in a peculiarly archaic ['Samaritan'] alphabet) contains the date, the name of the Jewish ruler, and the inscriptions 'Shekel of Israel,' 'Jerusalem the Holy,' 'Redemption of Israel.' The latest coins with Hebrew inscriptions date from the revolution of Bar Cochba under Hadrian. The value of the silver shekel is reckoned to be something over two shillings.

SHELBURNE, WILLIAM PETTY, Earl of, son of the first earl, and descendant of Sir W. Petty, founder of the science of political arithmetic, was born May 1737, and commenced his political career in 1761 by entering the House of Commons as member for Wycombe, but only sat for a few weeks, the death of his father having called him to the House of Lords. When Mr G. Grenville succeeded Bute in 1763, S., whose talents had made him remarked, although only 26, was placed at the head of the Board of Trade. When Chatham formed his second administration in 1766, he made S. one of the Secretaries of State, although not yet thirty. Upon the fall of Lord North's ministry in 1782, George III. sent for S., and proposed to him to form a government. He declined, not being the head of a party, and was sent by the king to the Marquis of Rockingham with an offer of the Treasury, himself to be one of the Secretaries of State. According to Earl Russell, in his *Life of C. J. Fox*, it soon appeared that S. was not so much the colleague as the rival of Lord Rockingham, the chosen minister of the court, and the head of a separate party in the cabinet. Upon the death of Rockingham in 1782, the king sent at once for S., and offered him the Treasury, which he accepted without consulting his colleagues. Fox thereupon resigned, and S. introduced William Pitt, then only 23, into office as his Chancellor of the Exchequer. S.'s ministry, on the occasion of the king's announcement of his determination to concede the independence of the American colonies, found itself outvoted by the coalition between Fox and Lord North. He resigned, and the coalition ministry took his place, but soon broke up. The nation expected that the king on this event would have sent for S., but William Pitt received the splendid prize, and S. was consoled by the coronet of a marquis (of Lansdowne). During the later years of his life, his health was delicate, and he withdrew from public life; but he came forward as a strong supporter of the union with Ireland. He indulged his tastes in the adornment of Lansdowne House. Here he collected a splendid gallery of ancient and modern pictures, together with a library of 10,000 volumes, comprising the largest collection of pamphlets and memoirs on English history and politics possessed by any man of his time, as well as a series of MSS., which were sold to the British Museum for £5000. He was a discerning patron of genius. It was while he resided in Lansdowne House as the librarian and friend of S. that Priestley made the discovery of oxygen. Jeremy Bentham was one of his most intimate friends. S. was the patron and friend of Sir S. Romilly, and twice offered him a seat in parliament. He was also on terms of intimacy with Mirabeau, Dumont, and other foreigners of literary and political distinction. He died at his house in Berkeley Square in May 1805.

SHE'LIF, the chief river of Algeria (q. v.).

SHELL. This term is employed to designate the hard outer coverings of a large number of invertebrate animals. Shells are met with in the *Echinodermata*, in the great majority of the *Mollusca* (excluding the Molluscoids), in a few of the *Annelida*, as Serpula, Spirorbis, &c., in the *Cirropoda*, and in the *Crustacea*. The forms of the different varieties of shells are sufficiently noticed in the articles on the classes of animals to which they respectively belong; and we shall confine our remarks to the intimate structure of shell, which, until the publications of Carpenter, Rainey, and others, during the last quarter of a century, was altogether misunderstood. The doctrine formerly held, and still maintained in many popular handbooks of conchology, was, that shell is not only extravascular (or devoid of vessels), but completely inorganic, being composed of an exudation of calcareous particles (chiefly carbonate of lime) cemented together by a kind of animal glue. It is now known that shell always possesses a more or less distinct organic structure, which in some cases resembles that of the *epidermis* of the higher animals, while in others it approximates to that of the *derma*, or true skin. The nature of the organic structure is so different in the Echinodermata, Mollusca, and Crustacea, that a separate description is required for each, and as Dr Carpenter remarks: 'Even in the subordinate divisions of these groups, very characteristic diversities are frequently observable, so that, as in the case of the teeth, it is often possible to determine the family, sometimes the genus, and occasionally even the species, from the inspection of a minute fragment of a shell, as well fossil as recent.'

In the *Echinodermata*, the elementary structure of the skeleton exhibits the appearance of a network composed of calcareous and animal matter intimately united. The diameter of these apertures or meshes of network varies to a certain degree in

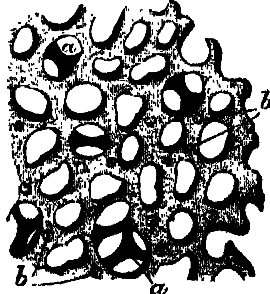


Fig. 1.—Thin Lamina of Shell of Echinus, shewing its Areolar Structure:

a, a, portions of subjacent layer; *b, b*, fractured bases of columns connecting the superposed laminæ. Magnified 134 diameters.

different parts of the same shell, the openings being larger in the inner than the outer layers, the extremes being $\frac{1}{1000}$th and $\frac{1}{1500}$th of an inch. The

entire shell is made up of an immense number of such plates, which lie parallel to one another, separated by minute vertical pillars.

In the *Mollusca*, the shell is formed upon the surface of the mantle, which corresponds to the true skin of other animals. Hence it must be regarded as epidermic. It consists of cells consolidated by a deposit of calcareous salts in their interior, but, as in the case of many other tissues, the original cellular organisation often becomes so hidden by subsequent changes, as to cease to be recognisable. The typical condition of the shell in this sub-kingdom is

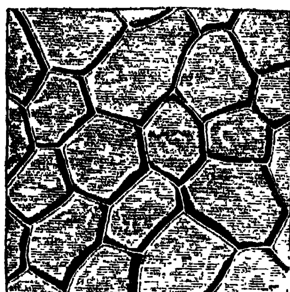


Fig. 2.—Section of the Shell of Pinna parallel to the surface, shewing Prismatic Cellular Structure, cut transversely, magnified 185 diameters.

best seen in certain bivalves—the genus *Pinna*, for example. On breaking off a small portion of the projecting margin of one of these shells, and examining it under the microscope, it is found to be made up of a vast number of prisms, hexagonal in form, and nearly uniform in size, which are arranged perpendicular to the surface of the lamina of the shell, so that the thickness of the lamina is formed by their length, and its surfaces by their extremities. On submitting such a lamina to the action of a dilute acid, the calcareous salts are dissolved, and a membrane is left which shews the prismatic structure as perfectly as it was seen in the original shell, the hexagonal divisions being evidently the walls of cells resembling those occurring in the pith or bark of a plant. It sometimes happens in recent, but more commonly in fossil shells, that the animal matter

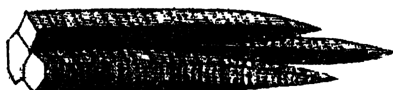


Fig. 3.—Calcareous Prisms of the Shell of Pinna, from Chalk.

decays and leaves the prisms ununited, and easily separable from one another. It is only in a few families of bivalves that the cellular structure is seen in this very distinct form, or that it makes up a large portion of the shell; and these families are closely allied to *Pinna*. In many shells, the external layer is formed on the above plan, while the internal layer is nacreous; in many, again, the nacre, or 'mother of pearl,' and in others sub-nacreous structure, constitutes nearly the whole thickness of the shell. The nacre, according to Sir D. Brewster, consists of a multitude of layers of carbonate of lime, alternating with animal membrane; and the grooved lines on which iridescent lustre depends, are due to the wearing away of the edges of the animal laminæ, while those composed of carbonate of lime stand out; it is, however, more probable, from Dr Carpenter's researches, that the peculiar lineation of the surface of nacre is due to the disposition of a single membranous layer in folds or plaits, which lie more or less obliquely to the general surface.

In the *Crustacea*, the structure of the shell has only been examined in the order of Decapods. In this order—in the common crab, for example—the

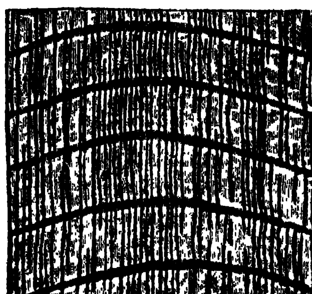
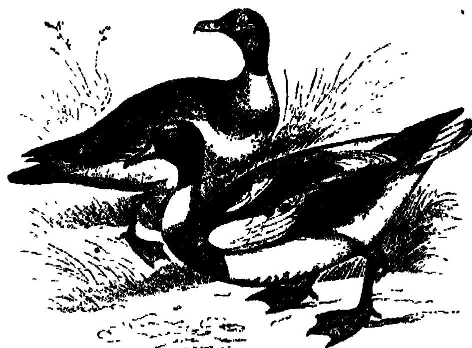


Fig. 4.—Portion of transverse section from Claw of Crab, magnified 400 diameters.

shell consists of three layers, viz. (1) an external horny epidermic membrane covering the exterior; (2) a cellular or pigmentary structure; and (3) an internal calcareous or tubular substance. The horny layer is easily detached after the shell has been for some time immersed in dilute acid; it is thin and tenacious, and presents no trace of structure. The pigmentary layer is very thin in the crab and lobster, but is much thicker in some other Decapods. The internal layer is that which constitutes the chief part of the shell; it is in this layer that the calcareous matter is chiefly deposited; but even after this has been removed, a very distinct animal basis remains, which closely resembles that which is left after the dentine of the teeth has been deprived of its inorganic constituents, as may be seen in the accompanying figure, representing a transverse section from the claw of the crab; the dark lines representing minute tubules.

For further information on this subject, the reader is referred to Dr Carpenter's various articles on the Microscopic Structure of Shells, and especially to his article 'Shell' in the *Cyclopædia of Anatomy and Physiology* (from which the materials of the present article have been almost entirely drawn), and to his *Microscope and its Revelations*.

SHELLDRAKE, or SHIELDRAKE (*Tadorna*), a genus of ducks of the section having the hind-toe without any pendent membrane. The shelldrakes



Shelldrake, female and male (*Tadorna vulpanser*).

are a connecting link between geese and ducks, having much resemblance to the former. The species are mostly natives of the southern hemisphere,

but the COMMON S. (*T. vulpanser*, or *Bellonii*) is common on the sandy sea-shores of Britain; many coming from the north for the winter, and some remaining all the year, and breeding, making their nests in rabbit-burrows or other holes in soft soil, whence in some places the S. receives the name of *Burrow Duck.* It is a beautiful bird, the sexes nearly alike in plumage; the head and upper part of the neck green, with a collar of white, and a lower collar of rich chestnut, extending over part of the back, the rest of the back white. The whole length is fully two feet. The S. is very capable of being tamed, and breeds in domestication. Its note is a shrill whistle. Its flesh is coarse and unpalatable.—The RUDDY S. (*T. rutila*), the only other European species, is rare as a British bird, although common in many parts of Europe and Asia.

SHELLEY, PERCY BYSSHE, the eldest son of Sir Timothy Shelley, Bart., the representative of an old Sussex family, was born at Field Place, near Horsham, in that county, on August 4, 1792. His earlier education he received at home with his sisters. About the age of ten, he was sent to a school near Brentford, and thence, three years after, transferred to Eton. Shy and sensitive, yet self-willed and unsubmissive, he suffered much from the harsh discipline of masters and the tyranny of his ruder associates. In his refusal to fag at Eton, he gave early indication of that passionate impatience of every form of constituted authority not approving itself to his reason which continued through life to distinguish him, and to find expression in his writings. In 1808, he left school, and after two years passed at home, he was sent to University College, Oxford. Even thus early, he had become a freethinker of a somewhat advanced kind, and a pamphlet, entitled *A Defence of Atheism*, which he circulated during the second year of his college course, led to his expulsion from Oxford. This so irritated his father, that for some time he declined to receive him; and on his rash marriage, in August 1811, to a Miss Harriet Westbrook, the daughter of a retired innkeeper, the estrangement between them became final and complete, the old gentleman consenting to allow his son a liberal yearly income, but never after having any intercourse with him. S.'s marriage was in its issue tragical. In 1813, a separation took place between him and his wife, who, with two children, returned to the care of her father; and three years after, the unhappy woman drowned herself. The refinements of intellectual sympathy which poets desiderate in their spouses, S. failed to find in his wife, but for a time he seems to have lived with her not unhappily; nor to the last had he any fault to allege against her, except such negative ones as might be implied in his meeting a woman he liked better. This was Mary Godwin, daughter of the celebrated William Godwin and Mary Wollstonecraft, with whom, in 1814, he travelled in France and Switzerland, and who afterwards became his second wife. Such excuse of his conduct in the matter as the theory of 'congenial souls' may afford in the eye of the moralist must to the full be allowed for S., whose later union was of almost ideal felicity and completeness. On the death of his first wife, he laid claim to his children; but this their grandfather, Mr Westbrook, strange as it may now seem, successfully resisted at law on the ground of his atheism, as exhibited in the poem of *Queen Mab*, which a year or two before he had printed, though only for private circulation. In 1815, while living at Bishopsgate, near Windsor, he wrote his *Alastor*, one of the most finished and characteristic of his works; which was followed by *The Revolt of Islam*, composed in 1817 at Marlow. During the interval, in the course of a tour in Switzerland, he had formed the acquaintance of Lord Byron, with whom afterwards in Italy he had much intimate intercourse. In March 1818, he left England finally—as it proved—to proceed to Italy; and during that and the following year, chiefly while a resident in Rome, he produced what may rank as his two finest poems—the grand lyrical drama of *Prometheus Unbound* and the tragedy of *The Cenci.* While at Venice with Lord Byron in 1820, he wrote *Julian and Maddalo*, a record in enduring verse of an interesting conversation of the discussional kind between the noble poet and himself. His other works of chief importance are: *Rosalind and Helen*, begun before he left England; *The Witch of the Atlas*, written in 1819; *Epipsychidion; Adonais* (a lament on the death of Keats); and *Hellas* (a lyrico-dramatic burst of exultation on the outbreak of the Greek war of liberty)—all three produced in 1821. The winter of 1822, S. passed at Pisa; and in the April following, he established himself near Lerici, in the Gulf of Spezia. His fondness for boating had through life amounted to a passion, and here he indulged it to the full. On July 8, 1823, in the company of an ex-naval friend, Mr Williams, he sailed from Leghorn, whither he had gone to welcome his friend, Mr Leigh Hunt, to Italy, and was lost in a sudden squall on his voyage homeward. The bodies were, after some time, washed ashore, and were burned, as the quarantine law of the country required, in presence of Lord Byron, Mr Leigh Hunt, and another intimate friend, Mr Trelawney. S.'s ashes were carefully preserved, and lie buried in the Protestant cemetery at Rome, near the grave of Keats.

In S.'s opinions, religious, social, and political, crude as they often were, and everywhere expressed with an unwise reckless vehemence, there was much that might reasonably offend; and they not only on their own account roused against him a storm of obloquy, but made him throughout life the accredited mark of the most foul and malicious slanders. To this chiefly it is to be attributed that, whilst he lived, his genius met with no wide appreciation; but since, it has been amply recognised, and perhaps no writer of his time at this day ranks higher on the whole than he. In sustained lyrical impetuosity, S. surpasses every other writer; his diction is not more remarkable for its opulence than for the expressive subtlety and precision with which it defines the nicest refinements of feeling and thought; and his page flashes with imagery like a royal robe rich with gems. But too often, whilst he dazzles, he also bewilders; he is fond of supersubtle abstractions, unsubstantial as clouds or dreams; and frequently in reading him we seem merely to be looking on wreaths of rainbow-coloured mist. This want of clear and firm outlines is more or less felt throughout all his larger works, with the single exception of *The Cenci*, in which a terrible story of real life is dramatised with consummate vigour and directness of treatment. As to the matter of the rest of his poems, they concern themselves, for the most part, not with the world as it is or has been, but with a perfected world which is to be. S. is the *vates* of the future, as Scott is the poet of the past. Of the charge of atheism against S., it is enough to say that it rests mainly on his boyish poem of *Queen Mab;* that this he did not himself give to the world; and that when, in 1821, it was surreptitiously published, he issued an express protest against his being held answerable for any opinions set forth in it. In his later works, a vague Pantheism seems indicated; and one or two passages occur which fairly admit of a purely theistic interpretation. The only complete edition of S.'s poems

is that published by Mrs Shelley in 1839. A selection from his letters, with translations and prose-essays appeared in 1840. See Medwin's *Life of Shelley* (1840); Trelawney's *Recollections of the Last Days of Shelley and Byron* (Lond. 1858); Thomas Jefferson Hogg's *Life of Shelley* (Lond., 2 vols., 1858), and the *Shelley Memorials*, by Lady Shelley (Lond., 1859).

By common testimony of all who knew him, S., who was held up to execration as a perfect monster of iniquity, was one of the purest, gentlest, most lovable of men; of the tenderest private affections, and, beyond the immediate circle of these, of the largest flowing charity. The passion of philanthropy expressed in his writings found as practical an expression in his daily life as if he had never made any very great profession of it. The episode of his first marriage seems more or less awkward for him; but the one passionate frailty of a boy can scarcely be held a serious blemish on a man whose whole subsequent life was exceptional in virtue and beneficence.

MARY WOLLSTONECRAFT GODWIN, wife of the poet, was born in London 1798, married Shelley, as above stated, in 1816; and in the same year produced a remarkable novel, entitled *Frankenstein*, the hero of which, a profound student of nature, discovers the secret of creating life, and produces a monster whose history, though wild and horrible in its incidents, is invested with a strong human interest. The work had a great success, and may be reckoned the best of Mrs Shelley's literary efforts. Other novels of hers are *Valperga*, *The Last Man*, *Lodore*, and *The Fortunes of Perkin Warbeck*. She likewise wrote *Rambles in Germany and Italy*; a series of biographies of foreign artists and poets for the *Cabinet Cyclopædia*; and carefully edited her husband's poems. She died in London, February 1, 1851.

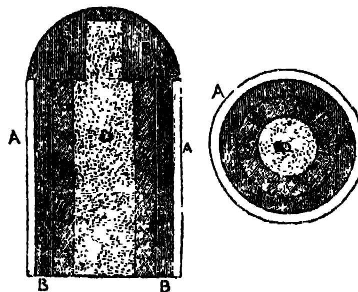
SHELL-GUN belongs rather to the past than the present, as in modern rifled artillery all guns fire shells. Before their introduction, however, shells were fired from guns of large bore, and proportionately small thickness of metal, not differing materially from howitzers, except that they had greater length.

SHELL-LAC. See LAC.

SHELLS, called in earlier times bombs, consist of hollow vessels of metal, containing gunpowder or other explosive compound, so arranged that it shall explode at a certain point, and spread destruction around by the forcible dispersion of its fragments. The invention of this murderous missile cannot be accurately traced. Shells were employed in 1480 A. D. by the sultan of Gujerat, and by the Turks at the siege of Rhodes, in 1522. The Spaniards and Dutch both used them during the war of Dutch independence; and they appear to have been generally adopted by about 1634. As shells required Mortars (q. v.) for their projection, they were not used in naval warfare until the French constructed special bomb-vessels in 1681; but since that period, shell-guns, being cannon of large bore, have been introduced, and shells are now employed by all ships of war.

Until within a few years, every shell was a hollow sphere of cast-iron, varying in thickness from half an inch to two inches, and in diameter from five and a half inches to thirteen inches. The sphere had a fuse-hole (like a bung-hole) an inch across, through which the charge was inserted, consisting of pieces of metal and powder to burst the shell. The hole was plugged by a fuse, which was a tube of slow-burning powder, timed to communicate fire to the charge after the lapse of a certain number of seconds. This fuse might either be kindled by hand the moment before the mortar was fired, or its ignition might be effected by the act of firing itself. The Shrapnell shell, introduced by Colonel Shrapnell of the Royal Artillery about 1808, contained a number of bullets, and being fired at bodies of men, it was timed to explode about 100 yards before reaching them, when the shell burst, and the bullets with the fragments continued their course, diverging continually as they went, until they reached their object in a death-cloud. The *Concussion shell*, or *Percussion shell*, is one in which the charge is fired by the detonation of a cap on striking an object. If sufficiently delicate to explode on touching a soft object, and at the same time not to be exploded by the resistance of the air to its rapid flight, this form of shell is the most certain in execution.

Since the introduction of rifled ordnance, the shell has become the commonest form of projectile. It has ceased to be spherical, and is usually in the shape of an elongated bolt. Several rival shells at present divide public favour, and compete for adoption into war service. Without noticing the numerous varieties which are in course of trial on the continent and in America, the following are the principal British competitors. The *Armstrong* shell is a pointed bolt of iron (usually percussion), containing an inner 'segment shell,' made



Armstrong Shell:
A, lead casing; B, outer shell; C, segments; D, charge.

up of 49 segments of cast iron. Seven of these segments form a circle, or ring and seven circles give the necessary length. A coating of lead affords a soft medium for fitting into the grooves of the gun. The shell thus made somewhat resembles a bottle without the neck. The necessary bursting charge having been inserted, the rear-end is plugged with lead, the fuse is screwed into the front, and the shell is ready for action. This projectile has a great and accurate range, and its segments cannot fail, on explosion, to do great damage. The principal drawback has been found in the lead-casing, which is often thrown off in parts soon after the shell leaves the gun, and which thus falls among the foremost ranks of the army using it, sometimes inflicting severe wounds. The *Whitworth* shell is an elongated hexagonal bolt of iron or steel, cast in one piece, and with a bursting charge at the rear-end. It explodes on percussion; but the space allowed for the burster is deemed insufficient to produce the full effect which the length and correctness of the weapon's range give cause to expect. The *Lancaster* shell is oval, to fit the


Whitworth Shell.

bore of the *Lancaster* gun (q. v.). There are many other forms, but they differ principally in the devices used for making the shell conform to the rifling of the gun. *Martin's* shell must, however, be noticed, from its peculiarity of being charged with molten iron, which sets on fire all combustible matter on which it can be thrown. The *Diaphragm* shell, invented by Colonel Boxer, R.A., has an iron division or diaphragm to separate the powder in the shell from any balls or slugs, in order that the friction of the latter may not prematurely cause the powder to explode. A six-pounder diaphragm shell contains 30 carbine-balls; an eight-inch shell, 322 musket-balls.

SHELL-SAND. Sand consisting in great part of fragments of shells, and often containing a small proportion of organic matter, is a very useful manure, particularly for clay soils, heavy loams, and newly-reclaimed bogs. It is also advantageously applied to any soil deficient in lime. It neutralises the organic acids which abound in peat, and forms with them compounds which serve as food for plants. Great deposits of shell-sand are found on the coasts of Devonshire and Cornwall, and are of great value in the agriculture of that district. Shell-sand is also found on many other parts of the British coast, and nowhere more abundantly than in the Outer Hebrides. The sand of many parts of the coast, however, being mostly silicious, is incapable of the same use. Shell-sand is much used as a manure in some of the maritime districts of France, as Bretagne and Normandy.

SHEMA'KHA, a maritime government of Transcaucasia, Russia, bounded on the S. by the river Kur, and on the N. by the Caucasus. Area, 21,654 sq. m.; pop. 633,886. North of the Kur and around its mouth the surface is level, low, and fruitful, and there are numerous warm and fertile valleys, though little of the surface is under cultivation. Only in the towns and seaports, and in the villages in their vicinity, are agriculture and industry pursued. The mountainous regions are inhabited by a rude predatory population.

SHEMAKHA, the capital of the government of the same name, about 70 miles west-north-west of Baku. It is a thriving town, carries on extensive manufactures of silk and cotton goods, and is much engaged in horticulture and in general trade. Pop. 22,014.

SHEMI'TIC (Semitic*) **LANGUAGES** the general name of a certain number of dialects, supposed at one time to have been spoken by the descendants of Shem. The term is of recent origin (Schlözer, Eichhorn), and a misnomer; for, in the first place, not all the nations derived in Genesis from Shem spoke an idiom akin to those understood by the term Shemitic (e. g., the Elamites, Lud, &c.), and, on the other hand, Canaan and Cush, whose Shemitic speech is undoubted, are there traced to Ham. Shemitic Languages, however, as a 'conventional appellation,' is still the best of all the general terms hitherto proposed (Arabic; Syro-Arabic, analogous to Indo-Germanic).

The family of Shemitic languages, which spread originally over Canaan (Phœnicia and Palestine), Assyria, Aram (Syria, Mesopotamia, Babylonia), and Arabia; and, at a later period, over part of Asia Minor and the Punic northern coast—i. e., from the countries on the Mediterranean to the Tigris, and from the Armenian Mountains to the south coast of Arabia—may broadly be divided into three principal classes: 1. The Aramaic or Northern (north-eastern) dialect, comprising, chiefly, the so-called Chaldee and Syriac; 2. The Southern, the chief representative of which is the Arabic, closely allied to whose older (Himyaritic) form is the Ethiopic; 3. The Middle, or principally Hebraic, to which also belong the languages of the other Palestinian inhabitants, those of the Canaanites and Phœnicians above all. The difference between the Middle and Northern branches, is less sharply marked, than between the Middle and the Southern or Arabic.

Before proceeding to treat of them individually, we shall try to point out their general position among other languages, and principally, the salient points of difference between the Shemitic and that other most important family of the Indo-Germanic or Aryan languages. First of all, then, we notice the preponderance given in Shemitic to the consonants in contradistinction to the vowels. The former are indeed the basis and the body of its words. The vowels are more or less accessories, modifying, fixing, precising the meaning, but never themselves containing it, while in the Indo-Germanic languages the root itself consists generally of a combination of vowels and consonants. A further peculiarity is the prevailing 'triliteralness' of Shemitic roots in the advanced stage in which we now know them. The Indo-Germanic languages derive their wealth from the logical law of their composition of roots, of verbs, and particles; the Shemitic add to their store in phonetically multiplying their sounds: either by splitting, as it were, their single consonants into two or more, through the reduplication of radicals, or by the addition of new consonants to the primary root, which is thus developed often from a monosyllabic (for by far the greatest number of Shemitic roots consisted primarily of two consonants only, to which a third was generally added at a later period) into a root of five letters. Compound words are of the utmost rarity both in the noun (except proper names) and the verb, and they never consist of combined roots of verbs and particles, but of verbal and nominal roots. Regarding the formation of cases, tenses, and all those other grammatical changes of noun and verb which, in the Indo-Germanic family, are wrought—as far as the verb or noun itself is concerned—almost exclusively by suffixes, while the radical vowel changes merely according to euphonic rules within its own limited sphere; the Shemitic languages, principally and chiefly work their flexions by a change of vowels within the radical consonants, leaving the latter themselves intact. Only when these changes suffice no longer for the more elaborate modes of speech and thought, supplementary letters and syllables are sought in aid, and a certain small number of prefixes or affixes represents the vast and varied groups of little words (amounting at times to whole phrases) of the Indo-Germanic. The Shemitic languages are also, if poorer, less complicated in forms than the former family. There are only two genders —which, however, are also distinguished in the second and third persons of the verb—and two principal tenses. These are strongly marked by the position of the personal pronoun, represented by a suffix in the so-called perfect and by a prefix in the so-called aorist or imperfect (future). The former expresses the finite, the completed action, the fact; the latter, the incompleted action, the thought, that which is becoming, growing, as it were, into a fact. One of the most curious features

* In Hebrew, the name from which the adjective is derived, is spelt *Shem*; but, as in many other cases, the *sh* of the original was transformed by the Septuagint into *s* (see SHIBBOLETH); and hence, through the influence of the modern versions that have in this respect followed the Septuagint, the form *Semitic* is more current among continental writers than *Shemitic*.

is the sudden change that may be produced in the two by a certain prefixed conjunctive-consonant. Perfect then becomes future, and *vice versâ*. Declension, in the Indo-Germanic sense, exists, if at all, in an extremely limited sense in Shemitic. The juxtaposition of two words (with slight vowel-changes) forms the genitive, while the other cases (in the Hebraic at least) are formed by prepositions. The oblique cases of pronouns are indicated by suffixes. The syntax is of the crudest and simplest description: a mere stringing together of sentences without any particular attempt at a logical and methodical arrangement of periods, according to their temporary superior or inferior relation to the subject-matter.

Another most important point of distinction between the two families is formed by what has been called their lexical difference, i. e., the want—except in a few isolated cases—of any correspondence or identity in their individual words. Most of those words which exhibit a similarity, can be shewn to have been either adopted at a late period, or they simply fall under the category of onomatopoeic words (words imitating the sound of the object expressed, and therefore shewing in all cases greater or smaller affinity to the original sound); or, again, words in which the common type of human language would involuntarily, and under all circumstances, connect a special meaning with a special sound, and would, therefore, be more or less identical in all idioms. Of words introduced into European languages by Shemitic (Phœnician) traders may be instanced, *kanva* = cane, *gamal* = camel, *mor* = myrrh, *kezish* = cassia, *ahelim* = aloe, *nerd* = nard, *carkon* = crocus, *sappir* = sapphire, *sak* = sack, &c. Of onomatopoeic terms, *lakak* = (Sansc. *lih*) to lick, *charat* (Sansc. *charidan*) = to grate, scratch, *galal* = to roll, *parak* = to break, &c. On the other hand, words have crept into Shemitic from foreign languages; e. g., the Egyptian, *ior*, *iero*, *iaro*, river, Nile, is found as *yeor* in Hebrew, *pardes* (Heb.) paradise, is Persian, *kop* (Sansc. *kapi*) is the Heb. for ape, *karpas* (Sansc. *karpâsa*) = wool, cotton, &c.

As regards the age of the family of Shemitic languages, it is matter of great doubt whether or not they were developed earlier than any other, e. g., the Indo-Germanic. The monuments that have survived are not sufficient for us to form a final judgment as yet. It stands to reason, however, that a development may have taken place simultaneously and independently in the idioms of other nations. The notion long cherished (and still upheld by a few isolated speculators) that Hebrew was the original language of all mankind up to the episode of the tower of Babel, may here be passed over without remark. See PHILOLOGY.

We shall now endeavour to draw an outline of the relation of the Shemitic languages among themselves, and to cast a rapid glance at their individual characteristics and history, referring for fuller details to the articles devoted to the special branches indicated. Although the Shemitic languages are clearly sister dialects, their relationship is far from being so close as, for instance, that of the different Greek dialects. Thus Abraham, belonging by his descent to a people of Shemitic tongue, and coming from a country where Shemitic was the general language, at his arrival in his new place of abode, inhabited by Shemites, was considered, and considered himself a foreigner to a much greater extent than it would have been the case had a Greek emigrated from one part of Greece into another. It would be more fit perhaps to institute a comparison between the different Shemitic dialects and the Germanic languages among themselves: German, Dutch, Danish, Swedish, Norwegian, &c.; or the Slavonic idioms: Lithuanian, Lettish, Russian, Polish, Bohemian. But even these are not so far removed from each other as the Shemitic idioms. What the latter have in common are those grammatical and other characteristics indicated above, and the *root-words* themselves, which nearly everywhere have the same original signification; only that in this respect the Arabic shews by far the largest development of meanings out of the single roots, and consequently an unparalleled wealth of derivatives. Yet it must not be forgotten that our relics of ancient Hebrew are of a scanty nature, and that the Arabic has remained a living language until our day, and has, through Islam, spread further than any ancient and perhaps even modern language.

Regarding the much-vexed question as to which of the Shemitic languages is the oldest, it must be confessed that no positive result has yet been attained. For although the oldest palpable monuments of Shemitic have survived in Hebrew, while our earliest documents in Aramaic date from Cyrus, and those in Arabic, even centuries after Christ (Himyaritic, Ethiopic, 4th c.; northern Arabic, 6th c. A. D.), yet we cannot now decide which of these has preserved the type of the original mother-tongue most intact. It sometimes happens that vast internal movements, or a series of events in the history of a people—wanderings, wars, and the like—change, quicken, and develop its language even to decay, before it has had time to beget a literature. When this time does arrive, we meet already with all the traces of this decay in imperfections, corruptions, and archaisms of form. Thus, the Hebrew of the Bible, that is the most ancient form in which it has survived, offers more grammatical analogies (in incomplete structure, inflexion, &c.) to the modern than to the ancient Arabic, which lasted in its primitive purity and fulness of form as long as the simple life of the dwellers in the desert was not broken by those events which upheaved, from the time of Mohammed, their whole existence, and brought them in closest and most violent contact with other nations of other tongues. Then that process of decomposition, or phase of negligence and corruption, set in, which resulted in the looseness exhibited by modern Arabic. It thus reached the downward stage of the Hebrew of the Old Testament at ever so much later a period. Arabic classical literature thus exhibits, compared with the Hebrew, and even more with the Aramaic—which we meet in a worse state of aged and crippled organism and stunted form—about the same vigour, freshness, and fulness of form and structure, which the Sanscrit exhibits among the Indo-Germanic or the Gothic in the narrower circle of the Germanic dialects. With all this, however, we cannot absolutely decide in favour of the Arabic as the nearest approach to the original type. The phase in which it enters into our historical horizon may be as far if not further removed from it even as the Aramaic. Its hasty individual development may have quickened more radical changes than even the decaying or decayed other branches present. So that, as we said, for the present at least, the question of priority must remain open. We shall, however, allot the first place to the second or Southern Shemitic (Arabic) class, simply because of its copiousness of words and development of forms. A faint trace of its peculiarity of article (*al*) is supposed to be found in Gen. x. 26 (*Almodad*); but this seems fallacious enough, considering that the Hebrew article must have been originally the same, and the word may simply exhibit the ancient Hebrew form. In the golden epoch of Hebrew literature, Arab culture does indeed seem to have stood in high renown—

Solomon's wisdom is likened unto that of the Arabs, Queen Sheba is an Arab queen, and Job's friends are Arabs. On its peculiar history and development, however, we cannot here dwell. (See ARABIAN LANGUAGE and LITERATURE.) Suffice it to observe generally, that Arabic is not only the richest of Shemitic, but one of the richest of all languages, with its more than 6000 word-roots, and about 60,000 words; while the Hebrew has about 2000 of the former and 6000 of the latter. The 22 consonants of the Aramæans, and the 23 of the Hebrews, have been augmented into 28 with the Arabs. They further have twice the number of the Hebrew regular conjugations, in which, again, the latter exceed the Aramaic by one. The same abundance is noticeable in the Arabic tenses, declensions, &c. The general wealth of this language, however, will be best appreciated by its possessing some thousand different terms for a sword, and a proportionate number of words for lion, serpent, and the like; while on the other hand, its adaptibility and versatility is shewn by one word often possessing a vast number of meanings. Anciently, it had two principal branches: the Himyaritic, spoken in the south, which has perished almost completely (a few partly mutilated inscriptions, recently brought to the British Museum, have been published some months ago, and their interpretation has been attempted by Osiander and Levy in the *Germ. Or. Society's Transactions*), and the Koreishite, which, being the idiom of Mohammed's tribe, became *the* paramount Arabic for all times. The Ethiopic (see ETHIOPIA) is by some investigators held to have flowed from the Himyaritic; but from the 14th c., the Amharic dialect (also Shemitic, but with little capacity for writing purposes) has superseded the Ethiopic almost completely.

The North Shemitic or Aramaic, to which we now turn, is the language of the whole district between the Mediterranean and the Tigris, south of the Taurus, north of Phœnicia, the Israelitish territory, and Arabia. Here we have again to distinguish between Syria Proper, Mesopotamia (between Euphrates and Tigris), and Babylonia (south of Mesopotamia), whither the Israelites were carried by Nebuchadnezzar. Yet, with respect to this latter country, it can hardly be doubted that another dialect besides the Aramaic was spoken in it. But whether this was 'Medo-Persian,' ('like the Assyrian'), or some other 'Turanic' idiom, largely mixed with Shemitic ingredients, must remain doubtful until our knowledge of 'Turanian' and our reading of cuneiforms shall have advanced somewhat further. There is, however, but one voice among competent investigators, that whatever strange elements the Babylonian and Assyrian languages may contain, they have a full claim to be reckoned among the Shemitic. The Aramaic in general is, as has been observed before, poorer than the Hebrew in grammatical forms, vowels, &c., besides having a peculiar tendency to blunting its consonants, changing its soft *s* into *d*, *ts* into *t*, *sh* into *th*, and the like. It further does not express its article by a prefix, but by an *Alef*, and it forms its passives, not by a change of vowels, but by a special syllable prefixed to the root. The first distinct trace of a difference between Hebrew and Aramaic is found in Gen. xxxi. 47, where it is found necessary to translate Laban's designation of the stone-heap erected in memory of his peace with Jacob. Although the ancient Babylonians had, in all probability, a rich and important literature; yet nothing of it has survived. The so-called Babylonian fragments supposed to have come down in Arabic translations are a mere fiction. All the Aramaic literature which we now possess is derived from the Jews, and of a very late date. The Babylonian exiles, both those who returned to Palestine and those who stayed in the land of their captivity, made Aramaic their habitual language. It was the common tongue of Palestine at the time of Christ, the Hebrew being then chiefly the 'holy language'—i. e., the language of temple and synagogue. Thus, the Shemitic words used in the New Testament are one and all Aramaic (Mammon; Raka; Eli, Eli, &c.; Talitha Kumi; Abba; &c.), and the same may be said of the Shemitic terms found in Josephus. The oldest remains in this idiom (variously called Hebraisti, Arami, Sursi, Chaldee) are certain portions of the Old Testament (Daniel, Ezra, &c.), the Targums (q. v.), the Mishna (to a certain extent, at least), the Talmuds, and the Midrashim. Idiomatic shades are again observable in these different documents; but while, as a living language, it was spoken and pronounced differently in the different districts of Palestine and Babylon, yet the special subdivisions into special provincial dialects which have been attempted can hardly be said to be correct. From the 2d c. A.D., Christian writers, chiefly in Mesopotamia, Edessa, Carrhæ, Nisibis, began to use this language in their writings, which are principally theological (Translation of the Bible) and dogmatical, but which also treat of medicine, history, philosophy, mathematics, &c. Yet their Aramaic assumed a character so essentially different, that, in some respects at least, it became an entirely distinct dialect, viz., Syriac, which, at a later period, assumed also—to make the breach complete—an alphabet of its own (Estrangelo). Many have been the attempts to account for this strange difference (the very existence of which was, on the other hand, almost totally denied at one time), but with no satisfactory result. Certain it is that the mere geographical reasons (East and West Aramaic, &c.) do not hold good, and are arbitrary and fallacious. The Syriac, as a living language, ceased to be spoken since the 10th c., and only a few Syrian Christians in Kurdistan and Mesopotamia are supposed to use a kind of vulgar Aramaic. Syriac literature ceased about three centuries later. As the language of the church, however, it is still in use with the Jakobite, Nestorian, and Maronite branches of the Syrian church. Minor sister dialects of Aramaic are the Samaritan, a corrupt Judæo-Aramaic mixed with Arabic words; the Zabian or Nazaræan (Mandaic), the language of a theosophical sect ('disciples of John the Baptist') standing between the Syriac and Chaldee, and mixed with Persian, but bearing altogether the stamp of an uncouth, ungrammatical, sadly-neglected idiom; further, the Palmyrene (Palmyra), which, with a written character closely akin to the square Hebrew, offers but little variations from the Syriac; and finally, the Ægypto-Aramaic, which is found on a few monuments (Stone of Carpentras, Papyri), and probably belongs to Jews, who, at a late period, had immigrated into Egypt, and had adopted the Egyptian religion. Its words are principally Judæo-Aramaic, but with a large infusion of foreign elements.

The third principal branch, the Middle Shemitic, which comprises Hebrew and Phœnician (Punic)—and all the questions connected with these—have been discussed at some length under JEWS and PHŒNICIA; to which we refer. See also the special articles ARABIC, CHALDEE, ARAMAIC, &c.

SHEMITIC NATIONS or SHEMITES. The different nations generally comprised under this name, viz., the Assyrians, the Chaldæans or Babylonians, the Syrians, Phœnicians, Hebrews, Arabs, and Ethiopians, are all treated specially in the

course of this work; it only remains here to add a few observations on the characteristics ascribed to them all in common, and on the influence they have exercised upon the history and development of humanity. As regards the language, the poverty of the inflections, the well-nigh absolute impossibility of expressing abstract ideas, the general absence of compound verbs and substantives, and the primitive state of the synthx in the Shemitic, as contrasted with the wealth and vigour of the Aryan, have been noticed in the previous article. From this arises, as an almost natural consequence, the general inferiority of Shemitic literature—to what we emphatically call 'classical literature.' Certain most important forms of Indo-Germanic poetry, for instance, are completely wanting in the Shemitic, such as the epopee and the drama; although, on the other hand, the peculiar ancient form of Arabic poetry—the Kasida—and the grand bursts of pathos found in the religious books of the Hebrews, are vainly sought in Indo-European literature. Again, a primitive state of Law seems to have developed among the Aryan nations, the chief characteristic of which was a recognition, albeit a dim enough one, of individual rights, in as far as they did not war against the complex unity of the 'State.' With the Shemites, in the absence of that talent for organisation and conciliation which is so essential a mark of the Indo-Europeans, we find either a patriarchal, an anarchical or a despotical kind of government. Science and philosophy, in the larger sense of the word, are the almost exclusive property of the Aryans. The inferiority of the Shemites in these respects, however, is amply counterbalanced by the sublime place they take as the ethical teachers of all humanity. How the hard and narrow egotism which, not quite unjustly, is ascribed to them, ever came to bear and ripen those grand moral maxims with which we meet in the earliest Jewish records, and which, wrought up to their purest idealism, form the shining glory of the New Testament, is a problem of which some seek the solution in a peculiar *intensity* of character inherent in the Shemitic races; while others account for it by direct 'Inspiration.' The same may be said of that Monotheism whi belonged, in the first instance, to the Hebrews out of all the nations of the earth. It is a grave mistake, however, to describe, as Renan does, the Shemites indiscriminately as monotheists. Babylon and Assyria, and Syria or Phœnicia, and the ante-islamic Arabs, were neither more nor less polytheistic than the early or present inhabitants of India. And, we may well add, not before the return from the Babylonian exile are the Jews themselves, as a body, to be considered as real monotheists. But ever since, both they, and, from the time of Mohammed, the Arabs, have been the representatives of a more austere and exclusive dogma of the unity of the godhead, than a great part of the civilised world has found good to accept up to this day. Both Christianity and Islam, the most powerful religious agents, the one for nearly two thousand years, the other for about twelve hundred, are in their origin Shemitic, and their influence need not here be enlarged upon. For what we owe to the Shemites in the field of industry and inventions, and the civilisation these carried with them wherever they were imported, we need only refer to PHŒNICIA. Nor ought we to forget that the very Alphabet itself is of Shemitic origin.

SHEMITIC PLURAL. The Shemitic languages, particularly the Hebrew, often use the plural where other languages only make use of the singular. This is particularly the case in terms of space and time—their vastness being conceived, so to say, as a multiplicity. Thus, certain regions, like Heaven—which, through the influence of the Bible language, is also with us sometimes used *pluraliter*—the expanse of water; further, the place at a person's head or feet, or even certain limbs of the body (conceived as space), like neck, face, &c.; or, again, periods of times, like youth, age, life, and special *lasting* qualities or states, like barrenness blindness, mercifulness, and the like, are put in plural number, where we have the singular only. It is further applied to might and strength, as consisting originally of a multiplicity of elements of power. This is particularly shewn in the word ELOHIM (q. v.), = a Unity of many 'Mights'—i. e., the Supreme Being. The false conclusions as to the plurality of the Divine Persons being proved by this word are best refuted by the occurrence of the plural in the word Master (Adon), Lord (Baal), when these stand unmistakably for a single human individual, and are meant to express merely his proprietorship of some object or other.

SHENANDO'AH, a river of Virginia, U.S., the largest tributary to the Potomac, drains the beautiful and fertile valley between the Blue Ridge and the principal range of the Alleghanies. It rises in two branches near the centre of the state, and runs north-east to the Potomac, 170 miles, being navigable for small boats 100 miles. In the war of 1861–1865, this valley was the scene of numerous conflicts, was successively occupied by the opposing armies, and finally laid waste by General Sheridan in the autumn of 1864.

SHE'NDY, a town of Africa, in Lower Nubia, on the right bank of the Nile, 100 miles in direct line below Khartoum. At its markets, two of which take place every week, a large variety of articles, as wheat, straw, salt, and cotton goods, are sold. Near the town, which gives name to a large district, the finest senna is obtained. Pop. about 10,000.

SHENSTONE, WILLIAM, the son of Thomas Shenstone of the Leasowes, Hales Owen, Shropshire, and his wife Anne Penn, was born there in the year 1714. In 1732, he was sent to Pembroke College, Oxford. Whilst there, he devoted himself much to the study of English poetry, and in 1737 he published without his name a small volume of miscellaneous verse. Subsequently, for some years, he lived in a somewhat vagrant way, yet without ceasing to cultivate his talent. In 1741, appeared his *Judgment of Hercules*; and next year, *The Schoolmistress*, the work by which chiefly he continues to be remembered. In 1745, his parents being dead, he established himself on his property of the Leasowes, where he thenceforth continued to reside. He busied himself with landscape gardening, and such was his success in beautifying his little estate, that it attracted visitors from all quarters, and brought him more fame than his poetry. He was thus, however, led into serious pecuniary embarrassments, from which, on February 11, 1763, a putrid fever relieved him.

The Schoolmistress, which has secured for its author a permanent if humble place among English poets, is written in the stanza and antique manner of Spenser's *Faery Queen*; and in the contrast between the stateliness of the vehicle, and the familiar and homely quality of the subject, with the graphic truth of its treatment, there is a singular source of charm. The other works of S. are for the most part quite insignificant; but his *Pastoral Ballad* has touches of exquisite tenderness and truth of sentiment expressed in a simple and appropriate melody.

SHEOL (LXX. *Hades*, *Thanatos*, Vulg. *Inferi*), a Hebrew term of very frequent occurrence (65

times) in the Old Testament, and rendered by the Authorised Version: grave, hell, or pit. Its derivation is doubtful: while some connect it with a root, denoting to seek, others derive it from a root, 'to dig out,' 'to hollow' (compare Germ. *Hölle*). The use of the word in the original would seem to prove a great fluctuation of the dogma respecting the world to come, during the various periods represented in the special parts of the Bible. Sometimes it does stand unmistakably for 'tomb,' although our notions of an artificially prepared grave do not originally belong to it; at other times, it is the abode of disembodied spirits, whether good or evil. It is the place where the dead go to be united with their 'people,' their 'ancestors,' friends, and all the departed. It was placed in the centre of the earth, or below the ocean, and was a dismal, dark place, like the Orcus, or Tartarus. It has gates and bars, it has chambers, valleys, and rivers, and its inhabitants—the shadows—(*Rephaim* = feeble ones), who ordinarily enjoy deep repose in this 'reign of silence,' are troubled by being called up to the surface, or tremble at the arrival of some great tyrant. As the receptacle of all things, it contains the shadows even of trees and kingdoms. It is described as all-devouring, remorseless, and insatiable. There can be no doubt of the existence of an idea—however vague—if not of immortality, in the modern sense, yet of some state after life among the Hebrews, even in the earliest times. For the Gehenna (Ge-Hinom) of the New Testament—the contemporaneous Sheol—see HELL.

SHEPHERD'S DOG, or SHEEP-DOG, the most useful and valuable of all kinds of dog, and universally employed by shepherds throughout Europe, and in the countries colonised from Europe, and also in some parts of Asia, to assist them in the tending of their flocks. Without it, the shepherd would be utterly incapable of taking care of the great number of sheep often under his charge; and the expense of keeping the requisite number of shepherds would far more than take away the profits of sheep-farming. That the dog was employed in the tending of sheep in very ancient times, we learn from the allusion to the *dogs of the flock* in Job xxx. 1. Buffon imagined the shepherd's dog to be the original of all the domesticated dogs; but was unable to assign any good reason for such an opinion. The shepherd's dog exhibits nearly the same characters in all parts of Europe, although there are slight diversities in different countries, as between that of England and that of Scotland, there known as the *Collie*. It is of middling size—differences of size, however, being amongst the characteristics of different races; of rather slender form, with a pretty sharp muzzle; the ears erect, or, in some races, drooping at the tip; the hair soft, long, shaggy, and somewhat waved; the tail slightly pendulous, more or less recurved, and very bushy; the feet well protected by hair, so as to be adapted for rough ground. The eye is very bright and intelligent, although the ordinary demeanour of the animal is remarkably calm and quiet. No kind of dog is more intelligent, and perhaps none so docile. Its ready comprehension of the meaning of its master, its prompt obedience to his word or gesture, its evident knowledge of what is requisite to be done, and the services which it performs, can never be observed without admiration. A shepherd's dog exhibits the utmost care to prevent sheep from straying off the road along which they are being driven, and sets itself, often of its own accord, to watch any gate or gap in the fence, or goes immediately to bring back stragglers. It is equally useful on the bleak moor or wild mountain, readily going for sheep, and bringing them from a distance. The sheep become perfectly acquainted with it, and evidently regard it as a friend, and not as an enemy, although the appearance of any other dog would alarm them at once. It knows the sheep of the flock it is required to attend, and even in a crowded market adroitly separates them from others with which they have become mingled. Its remembrance of places is obviously very accurate; and a dog which



Shepherd's Dog, or Collie.

has found great difficulty in conducting sheep through crowded thoroughfares, does the same work much better on subsequent occasions. The intelligence of the shepherd's dog has sometimes been proved in a very remarkable way by dishonest masters employing them to steal sheep; the master merely indicating by some sign the sheep which he wished to add to his own flock, and leaving the dog to do it in his absence. For stealing sheep in this way, a farmer in the south of Scotland was hanged about the end of last century. More frequent instances are on record of the shepherd's dog conducting a flock of sheep safely home for many miles, unaccompanied by the shepherd. The shepherd's dog is affectionate, and becomes strongly attached to its master, but is generally shy to strangers. It is generally treated with great gentleness by the shepherd; no severity is used in its training, nor could be used with advantage. It is very muscular and active, and capable, perhaps beyond any other kind of dog, of continuing its exertions during a long time.

The shepherd's dog is often crossed with other kinds of dog, and particularly with the pointer and setter. Dogs are thus obtained, which, whilst capable of all the services required by the shepherd, are equally capable of being employed in the pursuit of game, and are most successful in night-poaching.

The *Drover's Dog* is very often a cross between the shepherd's dog and the mastiff, the foxhound, the pointer, or the grayhound. It displays many of the best qualities of the shepherd's dog, and if too frequently very different from it in its cruel treatment of sheep, the fault is originally that of the brutal master.

SHEPHERD'S PURSE (*Capsella*—formerly *Thlaspi*—*Bursa Pastoris*), an annual plant of the natural order *Cruciferæ*, a most abundant weed in gardens and cornfields in Britain, and remarkable as one of the few plants that are found over almost the whole world, adapting themselves to almost all soils and climates. It is a very variable plant, from 3 inches to 2 feet in height, with root-leaves more or less pinnatifid, all the leaves more or less toothed, and rough with hairs. The root-leaves spread closely along the ground. The flowers are white and diminutive. The pouch, from which the English name

seems to be derived, is laterally compressed, and somewhat heart-shaped. This is a troublesome weed where it abounds, but being an annual, it is extirpated by continual and careful cultivation.

SHE'PPEY, Isle of, a portion of the county of Kent, insulated from the mainland by the Swale, an arm of the estuary of the Medway, is nine miles long, and four miles broad. In early times, its dimensions were much greater, but the sea has encroached upon, and is gradually eating away, the northern shore, which is lined by cliffs of London clay, from 60 to 80 feet in height. The church of Minster, formerly in the middle of the island, is now on the north coast. Great numbers of interesting fossils are found embedded in the London clay, of which the whole island is composed. In the north of the island, corn is grown, but the south districts, which are low, are laid out in grass. Almost the whole of the inhabitants are massed in the seaport of Sheerness (q. v.).

SHE'PTON MA'LLET, a market-town of Somersetshire, five miles east-south-east of Wells. It is a town of considerable antiquity, and is mentioned in *Domesday Book* as Sepeton. Its grammar-school, free to twelve boys, was founded in 1627. Worsted stockings, crape, serge, and velvets are manufactured. It contains several large breweries. Pop. (1861) 4868.

SHE'RBET, an oriental beverage, much used in Mohammedan countries, where stimulating drinks are forbidden. It consists of the juices of various fruits diluted with water, and sweetened exactly in the way in which lemonade is made in Europe.

SHE'RBORNE, a market-town of Dorsetshire, on the river Yeo, 18 miles north-north-west of Dorchester. The King's School, founded in 1550, has an endowment of nearly £1000 a year, and several exhibitions of £40, tenable for four years at either of the great English universities. There are several silk-throwing mills. Pop. (1861) 5793.

S. was the Saxon Sciréburn (*scir burna*, clear brook). It was erected into a bishopric in 705, and remained the seat of a bishop till 1075 or 1076, when the see was removed to Old Sarum. It was a prosperous place, and the seat of considerable cloth-manufactures in the time of Leland and Camden.

SHERIDAN, Richard Brinsley, was the son of Thomas Sheridan, a lecturer on oratory and elocution, in his day of some notoriety. He was born at Dublin in September 1751, in due course was sent to school there, and afterwards removed to Harrow. He gave no promise as a boy of the brilliancy he afterwards displayed as a man, being pronounced a hopeless dunce by all his teachers. He does not seem to have been brought up to any regular employment; and after his elopement and marriage in 1773 with a Miss Linley, a public singer of great beauty and accomplishment, his prospects did not seem bright, more especially as he insisted, on a point of pride, that his wife should give up her profession. As the readiest resource he betook himself to literature. The lighter drama was the sphere which attracted him, and in January 1775, his first comedy, *The Rivals*, was produced. Damned on its first appearance, through certain deficiencies in the acting, this piece on its repetition found gradually the favour with the public which its wit and vivacity deserved, and made the reputation of the writer. In the course of the year following, S. followed up his success by a farce of no very great merit, entitled *St Patrick's Day, or the Scheming Lieutenant*, and a second comedy, *The Duenna*, amid the sparkling dialogue of which are interspersed some songs of exquisite merit. He now became in some unexplained manner—for though his pieces were most successful, they could scarcely have brought him the necessary funds—part proprietor of the Drury Lane Theatre; and in 1777, his *School for Scandal* was produced there. This, which is by much his greatest effort, instantly leaped into the popularity it has ever since continued to retain. His other works for the stage were the inimitably clever farce, *The Critic* (1779), and, after a long interval, *The Stranger* and *Pizarro* (1798), both adapted from the German of Kotzebue. During this interval, he was deeply engaged in politics. S.'s wit and sprightliness coruscated in society as brightly as they did in his comedies; he was an admirable table-companion—over a bottle, the best of then living good-fellows. With Fox and his wild set, these gifts made him a prime favourite; and through the influence of Fox it was that in 1780 he was returned to parliament for the borough of Stafford. In his politics, he faithfully followed Fox, and the Whig party from time to time had good service from their brilliant recruit. He never failed to amuse the House, and when stirred by the trumpet-call of a great occasion, he was capable of rising to heights of noble eloquence. In particular, his famous speech, urging the impeachment of Warren Hastings (q. v.), is still traditionally remembered as perhaps the very grandest triumph of oratory in a time prolific of such triumphs.

In 1792, S. lost his wife; and three years after, he was married again to a Miss Ogle, who brought him five thousand pounds, to S. no doubt welcome, though trifling as a relief to the difficulties in which he had become involved, and which more and more continued to accumulate upon him. Always the most reckless and improvident of mortals, he did not improve with time. His later years were years of wretched struggle, of which debt, duns, and dissipation may furnish a convenient alliterative summary. His health failed him with his fortunes; and his friends, not finding him in his sickness and adversity quite so amusing as formerly, naturally failed him also—notably and shamefully, the Prince Regent, whose dull brains over the wine-cup he had many a time been made use of to brighten. Some honourable exceptions there were, among whom the poets Rogers and Moore may be mentioned as steadily kind to him to the last. He died in London on the 7th July 1816, in his sixty-fifth year.

For the detail of his life, the biography by his friend Moore may be consulted; and a just and delicate appreciation of his genius will be found in Hazlitt's *Lectures on the Comic Writers*.

SHERI'F (Arab. noble), designates, among Moslems, a descendant of Mohammed, through his daughter Fatima and Ali. The title is inherited both from the paternal and maternal side; and thus the number of members of this aristocracy is very large among the Moslems. The men have the privilege of wearing green turbans, the women green veils, and they mostly avail themselves of this outward badge of nobility—the prophet's colour—while that of the other Moslems' turbans is white. Many of these sherifs founded dynasties in Africa; and the line which, now-a-days, rules in Fez and Morocco, still boasts of that proud designation.

SHE'RIFF (A.-S. *scir-gerēfa*, the reeve or fiscal-officer of a shire; compare Ger. *graf*), in English Law, is an officer whose duties are chiefly ministerial (for he has only a few trifling judicial duties). The office is of great antiquity. The sheriff was formerly chosen by the inhabitants, though probably requiring confirmation by the crown. But popular elections for that purpose were put an end to by a statute of 9 Ed. II,

which enacted that in future the sheriffs should be assigned by the chancellor, treasurer, and judges. Ever since that statute, the custom has been, and now is, for all the judges of the common law courts, with the Lord Chancellor, and Chancellor of the Exchequer, to meet in the Court of Exchequer at Westminster on the morrow of All Souls, and then and there propose three persons for each county to the crown. This is called the pricking of the sheriffs, and the crown afterwards selects one of the three nominated, and appoints him to the office. A sheriff continues in office for one year only, and cannot be compelled to serve a second time. The office is not only gratuitous, but compulsory, for if the person appointed refuses, he is liable to indictment. In practice, country gentlemen of wealth are appointed. In the city of London, the sheriffs are appointed not by the crown, but by the citizens. The sheriff has important official duties in elections of members of parliament. He is, by his office, the first man in the county, and superior to any nobleman while he holds office. He has the duty of summoning the *posse comitatus*—i. e., all the people of the county—to assist him in the keeping of the Queen's peace; and if any person above the age of fifteen, and under the degree of a peer, refuse to attend the sheriff after due warning, he incurs a fine or imprisonment. The chief legal duty which the sheriff discharges is that of executing, i. e., carrying out all the judgments and orders of the courts of law. It is he who seizes the goods of debtors or their persons, and puts them in prison. For this purpose, he has a number of persons called bound-bailiffs (or, in popular dialect, bumbailiffs), who in practice do this invidious work, and give a bond to the sheriff to protect him against any mistake or irregularity on their part. The necessity of this bond is obvious, for the doctrine of law is, that the sheriff is personally responsible for every mistake or excess made or committed by the bailiffs in executing the writs or process of the court, and frequent actions are brought against him by indignant prisoners, or debtors whose persons or goods have been arrested; and the courts watch jealously the least infringement of personal rights caused by these bailiffs. Every sheriff has also an under-sheriff and deputy-sheriff, the latter being generally an attorney, who takes charge of the legal business. One of the ornamental duties of the high-sheriff is to receive and escort the judges when holding the assizes in the provinces.

SHERIFF, in Scotland, is a title given to three county officials. The lord lieutenant is 'sheriff-principal,' and as such, though he performs no duties, takes precedence of all others in the county. The 'sheriff-depute' discharged all the duties of the office until quite recently, when the greater part of them has been practically devolved on the 'sheriff-substitute.' In Scotland, the office of sheriff is still that of a local judge, and not merely ministerial, as in England. The institution of the office is very ancient, and the jurisdiction, both civil and criminal, was, and still is, very extensive. By the statute 20 George II. c. 43, the office was put on a better footing. The principal, or high sheriff, was debarred from performing any judicial duty, and it was enacted that none should be appointed to be a sheriff-depute but an advocate of at least three years' standing. The sheriff-depute is disqualified from acting as advocate in any cause originating in his county, though in other respects he is at full liberty to practise. He holds his office for life or good behaviour, and he may be removed for misconduct on a complaint presented to the Court of Session by the Lord Advocate, or four freeholders of the county. The same statute gave each sheriff-depute power to appoint a sheriff-substitute, who must be an advocate, or a solicitor, of three years' standing. The sheriff-substitute was at first appointed during the pleasure of the sheriff-depute, but he now holds office *ad vitam aut culpam*, and being bound to reside within his county or district, and prohibited from taking other employment, while the sheriff-depute is now bound to attend the sittings of the Court of Session in Edinburgh, he, in practice, exercises the original jurisdiction attaching to the office. The civil jurisdiction of the sheriff extends to all personal actions on contract or obligations without limit, actions for rent, forthcomings, poindings of the ground, and possessory actions; and in these cases there is an appeal from the decision of the sheriff-substitute to that of the sheriff-depute. He has also a summary jurisdiction in small-debt cases where the amount in question is not above £12; and these cases are determined without the usual pleadings. The sheriff does not try civil causes with a jury. In criminal cases, the sheriff has jurisdiction in all the minor offences which do not infer death or banishment. He has also jurisdiction in cases of bankruptcy and insolvency to any amount. In small-debt actions, criminal and bankruptcy matters, there is no appeal from the sheriff-substitute to the sheriff-depute. The sheriff is responsible for maintaining the public peace, and when he is present his jurisdiction excludes that of the justices of the peace in riots and breaches of the peace. He has charge also of taking the precognitions in criminal cases. He revises the lists of electors, and returns the writs for the election of members of parliament; and this last is almost the only duty which he performs in common with the English sheriff. An idea of the multifarious duties performed by the Scotch sheriff, may be gathered from the statement that he exercises, within a comparatively small district, the functions which in England are exercised by the commissioners in bankruptcy, county-court judges, the stipendiary magistrates, recorders, revising barristers, and coroners. He has also duties as Commissary (q. v.).

The office of sheriff is one of the few which may be traced back to the Saxon times, and it appears originally to have been the same both in England and Scotland. The sheriff was at first elected by the freeholders to be the chief man of the shire, and seems to have possessed unlimited jurisdiction to keep the peace; to have presided in all the courts; to have punished all crimes, and have redressed all civil wrongs. This extensive jurisdiction has been gradually infringed upon, partly by the exercise of the royal prerogative, and partly by parliament. But in England it suffered more from the appointment to the office of men unfit to exercise judicial powers, and from the consequent usurpation of their functions by the supreme courts. The same causes operated in Scotland, though to a less extent. In England they resulted in the almost entire abolition of the judicial functions of the sheriff. In Scotland, they resulted in his being deprived of the more important parts of the criminal jurisdiction, particularly of the power to punish by death; and in his civil jurisdiction being limited mainly to questions affecting movables. In both countries, feudal principles prevailed so much over the old Saxon, that the office frequently came to be hereditary, which tended to a separation of the duties of the office into the honorary and the laborious—the former being performed by the principal sheriff, and the latter by the deputy. In Scotland, this separation was completed by the act of Geo. II., which entirely separated the offices, by the transference of the power of appointing the

depute from the principal sheriff to the crown. In England, this complete separation has never become necessary, from the fact of the sheriff's power having been much more crippled than in Scotland. Indeed, in England, so purely honorary and ministerial has the office become, that it has been held by a female, and in Westmoreland, the office was hereditary down to 1849. The duty of enforcing the orders of the supreme courts, which now in England are a principal part of the duties of the sheriff, appears to have been engrafted on the office—probably on the theory that these orders were those of the king himself. In Scotland, the sheriff has never been called on to enforce any writs except those actually and not merely in name proceeding at the instance of the crown.

SHERIFF-CLERK, in Scotland, is the registrar of the sheriff's court, and as such has charge of the records of the court. He registers, and, when required by the proper party, issues the sheriff's judgments. He also conducts what correspondence may be required. He has important duties to perform in regulating the summary execution which is issued in Scotland against the debtors in bills of exchange, promissory notes, and bonds, without the necessity of any judicial suit.

SHERIFF-MUIR, a name given to several moors in Scotland on account of the 'wapinschaws' which used to be there held, under the superintendence of the sheriff. The only moor of this name which appears prominently in Scottish history is situated in Perthshire, on the northern slope of the Ochils, two miles north-east of Dunblane, and was the site of the great battle between the adherents of the Houses of Stewart and Hanover, 13th November 1715. The former, who consisted of the northern clans under the Earl of Seaforth, and the western clans under General Gordon, numbering about 9000 in all, were on their march southwards, under the leadership of the Earl of Mar, to join the Jacobites who had risen in the north-west of England, when they were met by the Duke of Argyle at the head of 3500 disciplined troops. After lying under arms all night, the Macdonalds, who formed the centre and right of the Highland army, attacked the left of their opponents, and routed it so completely that the fugitives fled with all speed to Stirling, carrying the news that Argyle had been totally defeated. Argyle, however, with his dragoons had meantime driven the left of the Highlanders back for two miles, when the right and centre returned from the pursuit, and took him in rear: he then skilfully withdrew his men to a place of shelter, and remained facing his opponents till the evening, when he retired to Dunblane, and next day to Stirling. About 500 were slain on each side. As a mere battle, the victory lay with the Highlanders; but it was so little decisive, that it paralysed the action of the Jacobites almost as effectually as a defeat would have done.

SHERLOCK, THOMAS, D.D., an English prelate, was the son of Dr William Sherlock, Dean of St Paul's, and was born in London in 1678. He was educated at Eton and Catharine Hall, Cambridge, where he took the degree of M. A. in 1701. In 1704, he obtained the Mastership of the Temple; in 1714, he became vice-chancellor of his college, taking the degree of D.D. in the same year; and in 1716, Dean of Chichester. Eleven years later, he was raised to the see of Bangor, was transferred to that of Salisbury in 1734, and in 1748 to that of London. He died in 1761. S. was a strenuous Tory, and supported the Church-and-State politics of his day with a sort of dull dignity. He displayed a good deal of diplomatic skill in his different official positions, whence Bentley nicknamed him 'Cardinal Alberoni;' his eloquence and learning were likewise of a very superior order, as may still be ascertained from his 4 vols. of *Sermons* (1755—1776), which were highly praised in their day. Besides these sermons, he wrote a variety of controversial treatises and pamphlets, all of which are now wholly forgotten.

SHERMAN, WILLIAM TECUMSEH, an American general, born in Ohio in 1818, was educated for the army at the military academy of West Point, and received a commission as 1st lieutenant in 1841. During the war with Mexico, he served in California, and was promoted to the rank of captain. In 1860, at the secession of the Southern States, he was residing at New Orleans in a civil capacity, but went north, and at the commencement of the war offered his services to the Federal government, was appointed colonel of infantry, and was in the battle of Bull Run. Raised to the rank of brigadier-general, he succeeded General Anderson in the department of Ohio, from which he was removed for declaring that it would require 200,000 men to hold Kentucky. He distinguished himself at the battle of Shiloh, and as major-general in the siege of Vicksburg. Raised to an independent command, he marched across the state of Mississippi, and after the defeat of General Rosencranz, took command of the army in Georgia, forced General Hood to evacuate Atlanta, and then marched across the entire state, capturing Savannah and Charleston; from which point he moved north, capturing the most important Confederate positions, and by cutting off the resources of General Lee, compelled the evacuation of Richmond, and the surrender of General Lee to General Grant, April 9, 1865. The surrender of the army of General Johnstone to General S. in North Carolina a few days later, and that of General Kirby Smith, west of the Mississippi, closed the war. No northern general, not even Grant himself, has acquired greater fame or popularity than Sherman. He divides with Lee and Stonewall Jackson the admiration of impartial foreigners. The supreme abilities of Grant have perhaps as yet not received a sufficiently generous recognition abroad; but S. has had ample justice done to the daring originality of design, the fertility of resource, brilliant strategy, and untiring energy, that made Grant pronounce him 'the best field-officer the war had produced.'

SHERRY. See WINE.

SHE'RWOOD FOREST, a stretch of hilly country in the west of Nottinghamshire, lying between Nottingham and Worksop, and extending about 25 miles from north to south, and 6 to 8 miles from east to west. It was formerly a royal forest, and the traditional scene of many of the exploits of the famous Robin Hood and his followers; but it is now almost wholly disafforested, and is occupied by gentlemen's seats and fine parks. The town of Mansfield and a number of villages are situated within the ancient bounds. Numerous remains of the old forest are still to be seen. The soil, which is principally a species of quartzose gravel, is in some places fertile, in others almost barren, and on the whole but of moderate quality.

SHE'TLAND, ZETLAND, or anciently **HIALTLAND**, is a group of about 100 islands, 23 of which are inhabited. The extreme north point—Hermaness in Unst—is in lat. 60° 50′ N., and long. 0° 53′ W. The southmost point of the group is on the Mainland, and is in lat. 59° 51 N., and long. 1° 15′ W. Fair Isle, however, is still further south, lying about midway between Orkney and S., to the last of which it belongs. The population of S. in 1861 was 31,670, females exceeding males by 5564. There

were in S. at the same date 6327 families, 1555 children at school, and no less than 5517 inhabited houses. In 1801, the pop. was 22,379, showing an increase of 9209 during the last half century. Illegitimate births are rare. Lerwick may be said to be the only town in S.—Scalloway being the place next it in size and importance. As the centre of trade for S., Lerwick is in all respects well situated. It is the seat of the custom-house, courts of law, and other public offices, and has about 70 shops. It has a fine natural harbour, where the weekly steamer from Granton lies at anchor for a couple of days. Passengers, the mails, and a large portion of the exports and imports, arrive and leave by this steamer. The pop. of Lerwick is 3580, having more than doubled itself during the last 50 years. Fort Charlotte, now used as a prison, court-house, &c., is situated at the north end of the town—to the pretty and picturesque appearance of which it greatly contributes. Lerwick has no hotel, and only two licensed public-houses; there are, however, several lodging-houses. The chief articles of import are oatmeal, flour, tea, tobacco, spirits, sugar, cotton and woollen manufactured goods, timber, tar, salt, &c. The value of the meal and flour imported varies with the state of the S. harvest, but is believed to range from £15,000 to £20,000 annually—the grain raised in the country being always far short of the requirements of the population. Tea is largely consumed by all classes. No wood grows in the country, and the supplies of timber are drawn chiefly from Norway. This is almost the only foreign product which comes direct. Other articles liable to duty pass through the custom-houses at Leith and Aberdeen. In 1863, the number of vessels with cargoes arriving from ports in Great Britain was 149, having a register tonnage of 21,500, and from foreign ports 8, with a tonnage of 600. The principal articles of export are dried salt-fish, herrings, fish-oil, cattle, horses, eggs, and woollen articles knitted by hand. The last are remarkable for their beauty and fineness of workmanship. The steamer has taken away as many as 54,000 eggs at one time, and in 1862 it carried away 2093 cattle and 589 horses. About 3000 tons of dried salted fish are sent away annually, about one-half of them to Spain. The export of herrings varies from 4000 to 10,000 barrels. Chromate of iron is found in Unst, and has long been and still is an important article of exportation. Iron pyrites was at one time exported from Fitful, when the price of sulphur was high; and copper ores have been quarried and sent south from Sandlodge. The total exports exceed in value £100,000 annually.

Fishing is the chief employment of the male population, but each fisherman has usually a small farm, paying a yearly rent of £4 to £5—the labour on which is mostly performed by the female portion of his family. Spade-cultivation is almost universal among the small tenants, but the one-stilted plough may still be seen at work. Nearly every house has a quern or hand-mill, and every township has one or more of the old Norse water-mills. The spinning-wheel is common, but in some parts has not quite supplanted the spindle. Carts are very rare, and in many districts unknown. The sheep and ponies, which run at large on the Scaltald or Common, are marked, and the mark of each tenant is registered. Men and women still wear the *rivlin*, a kind of sandal, made of untanned leather. In some places, the land is still held runrig, and the tenants of a few islands on the west still hold their stock as steel-bow. Till a very late period, the Norse poor-law was in full operation—the poor being quartered on certain districts, going from house to house, and staying a longer or shorter period in each, according to the size of the occupant's farm. Many peculiar words, of Norse origin, are still found in the dialect of the Shetlander, whose English is soft and pleasant. Many of the people still eat their fish wind-dried and slightly tainted. The young men who do not devote themselves to the fishing at home, go to Davis' Strait and Greenland in whalers from Peterhead and Hull, or are employed as sailors from some of the large shipping-ports of the kingdom. They are much liked as seamen, being naturally intelligent, sober, and sedate. S. is joined with Orkney as a county, and has a constituency of about 180. The superficial extent of land is estimated at 400,000 acres, of which about 26,000 are under cultivation. The valued rent in 1864 was £28,799.

Ronas Hill, in the parish of North Mavine, is about 1500 feet above sea-level, and is the highest hill in the group. The cliff-scenery is in many parts exceedingly beautiful; that about Papa Stour not being surpassed anywhere in Scotland. The climate is moist and variable. The prevailing winds are south-east and south-west. The mean summer temperature is 49°·6, and the mean winter, 40°·2. The winters, therefore, are warmer than those of the south of Scotland, and the summers colder. The mean rainfall is 43·4 inches. The prevailing diseases are dyspepsia, rheumatism, and catarrh. The infant mortality is not high. Idiocy and imbecility are of frequent occurrence. Of the original inhabitants of S. we have little or no knowledge; but the physiognomy, aspect, character, and language of the present population point to a Norse or Scandinavian origin. (See ORKNEY.) Fair hair and blue eyes are exceedingly common.

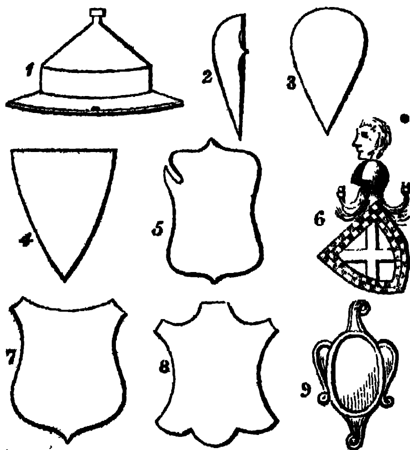
Cairns, covering both the long and short stone coffins, with skeletons, clay urns, and weapons, and vessels of stone in them, have been found in Unst and elsewhere. Tumuli, consisting of burned stones and earth, are frequent, and in turning them over, the remains of rude buildings are found, and stone implements of various forms. Burghs or 'broughs'—circular strongholds of unhewn stone—are extremely numerous—generally on a cliff or headland, but not rarely on artificial islands in fresh-water lochs. The most perfect 'brough' in existence anywhere is in the island of Mousa. Underground houses have been found in Sandsting of a very rude type, and associated with them, there occurs the rudest form of stone implement which has hitherto been discovered. A stone of the Christian period, with an Ogham inscription, was found in Bressay. No Runic inscriptions are known to exist in the islands; monoliths are somewhat frequent. Stone circles are rare, and in no case of great size.

SHI'BBOLETH (Heb. ear of corn, or stream), the test-word used by the Gileadites, under Jephthah, after their victory over the Ephraimites, recorded in Judges xii. 6. It appears that the latter could not pronounce the *sh*, and, by saying *sibboleth*, betrayed themselves, and were slaughtered mercilessly. It may be noticed that all those Hebrew names in the Old Testament, which commence with the *sh*, have now, through the inability of the Septuagint to render this sound in Greek, become familiar to us through the versions that flowed from it, as beginning with the simple *s*, e. g., Sem, Simon, Samaria, Solomon, Saul, &c. The word Shibboleth is used in modern languages in the sense indicated: viz., a test of speech and manners of a certain rank or class of society.

SHIEL, LOCH, in the west of Scotland, forms part of the boundary between the counties of Argyle and Inverness, separating the district of Moidart on

the north from those of Sunart and Ardgower on the south. The head of the loch is about 16 miles west of Fort-William. It is 15 miles long, and about one mile broad, and communicates with the sea by Shiel Water and Loch Moidart.

SHIELD, a piece of defensive armour, borne on the left arm, to ward off the strokes of the sword and of missiles. It has been constantly used from ancient times through the middle ages, till the invention of firearms rendered it useless. The large shield worn by the Greeks and Romans (Gr. *aspis*, Lat. *clipeus*) was circular, and often ornamented with devices. Another form of shield (Lat. *scutum*) was used by the Roman heavy-armed infantry, square, but bent to encircle the body. The early shield or knightly escutcheon of the middle ages was circular in outline, and convex, with a boss in the centre; the body generally of wood, and the rim of metal (No. 1). In the 11th c., a form came into use which has been compared to a boy's kite (No. 2), and is said, with some probability, to have been brought by the Normans from Sicily. It was on the shields of this shape that armorial designs were first represented. These shields were in reality curved like the Roman *scutum*; but after heraldry began to be systematised, we generally find them represented on seals, monuments, &c., as flattened, in order to let the whole armorial design be seen. In the 13th c., this long and tapering form began to give place to a pear-shape (No. 3), and a triangular or heater shape (No. 4). During the 14th c., these new forms became more generally prevalent, and the heater-shape, which was perhaps most frequently represented on armorial seals, began to approach more to an inverted equilateral arch. The same variety of forms, with some modifications, continued during the 15th c., a tendency appearing in all representations of the heater-shaped shield to give it more breadth below. A notch was often taken out in the dexter chief for the reception of the lance, in which case the shield was said to be *à bouche* (No. 5). Subsequent to the middle of



Shields.

the 14th c., when the shield came to be depicted as surmounted by the helmet and crest, the shield is often represented *couché*, that is, pendent from the corner (No. 6), an arrangement said to have originated in the practice of competitors hanging up their shields prior to a tournament, where, according to De la Colombière, if they were to fight on horseback, they suspended it by the sinister chief, and if on foot, by the dexter chief. A square shield denoted a knight-banneret. Shields of arms were often represented as suspended from the *guige*, or shield-belt, which was worn by the knights to sustain the shield, and secure it to their persons.

After the introduction of firearms made shields no longer a part of the warrior's actual equipment, the form of the shields on which armorial bearings were depicted, on seals, monuments, brasses, &c., varied greatly in form, and generally speaking, became gradually more tasteless, fanciful, and unmeaning (Nos. 7, 8, 9). A tendency has, however, been shewn in recent heraldry to recur to the artistic forms prevalent in the 14th and 15th centuries.

In early times, shields of the form which generally prevailed at the period, were exhibited on the seals and monuments of ladies; but about the 15th c., the practice began, which afterwards became usual, of unmarried ladies and widows (the sovereign excepted) bearing their arms on a lozenge instead of a shield.

The heraldic insignia of towns, corporations, &c., as well as individuals, are placed on shields. The bearing of Merchants' Marks (q. v.) in a shield was prohibited by the heralds of the 16th c. under severe penalties, and yet not a few instances are to be found on monumental brasses of these devices being placed on shields.

SHIELDS, North, a rising seaport of Northumberland, on the right bank of the Tyne, and at the mouth of that river, opposite South Shields, and eight miles east-north-east of Newcastle. It stretches more than a mile along the river-bank, and is rapidly extending westward. Possessing all the usual institutions, as churches, schools, theatre, custom-house, Sailors' Home, &c., it is not distinguished by any striking architectural features; and it is indebted to its rising trade and manufactures for its importance. There are numerous collieries in the vicinity, and the Northumberland Docks, which are within the borough, export more than a million tons a year. The resident shipowners of North and South Shields possess together upwards of 200,000 tons of shipping. The harbour is bordered with quays, and is spacious enough to accommodate 2000 vessels of 500 tons each. The building of wood and iron vessels, the manufacture of anchors, chain-cables, ropes, blocks, masts, and other articles of ship-furniture, are the principal branches of industry. North S. is included in the municipal and parliamentary borough of Tynemouth, the pop. of which (1861) is 32,321.

SHIELDS, South, a custom-house port, municipal and parliamentary borough, and market-town of Durham, on the south bank of the Tyne, and at the mouth of that river, 9 miles east-north-east of Newcastle by river and railway. The town stretches for two miles along the side of Shields' harbour, which is lined with numerous dockyards and manufactories. The Tyne Dock, containing 50 acres of water space, in which upwards of a million tons of coals are annually shipped, and a large import trade is carried on, is within the borough. The market-place is a spacious square in the centre of the town, near which is the large church of St Hilda. The town, with North Shields, is the principal port in the kingdom for the building of tug-steamers. There are large alkali and glass-works, and every kind of manufacture connected with shipping. A steam-ferry for passengers and carriages plies day and night between the two towns. Extensive piers, which are to extend to a depth of 30 feet at low-water into the sea, are more than half completed. Shields' bar has recently been removed by dredging, in order, with the piers, to form a harbour of refuge.

The sea-coast, in the neighbourhood, is interesting from the rocks and caves. The life-boat is a South S. invention. South S. sends one member to parliament. Pop. of borough (1861), 35,239.

SHI'ITES ('sectaries,' from the Arab. *Shiah*, *Shiat*, a party, a faction), the name given to a Mohammedan sect by the 'Sunnites' (q. v.), or orthodox Moslems. The S. call themselves 'followers of Ali,' and have special observances, ceremonies and rites, as well as particular dogmas of their own. The principal difference between the two consists in the belief of the S. that the Imamat, or supreme rule, both spiritual and secular, over all Mohammedans, was originally vested in Ali Ibn Abi Taleb, and has been inherited by his descendants, to whom it legitimately now belongs. The Persians are S.; the Turks, on the other hand, are Sunnites; and this division between the two nations dates chiefly from the califate of Mothi Lilla, the Abasside, in 363 H., when political dissensions, which ended in the destruction of Bagdad and the loss of the califate of the Moslems, assumed the character of a religious war. The S. themselves never assume that (derogatory) name, but call themselves *Al-Adeliat*, 'Sect of the Just Ones.' They are subdivided again into five sects, to one of which, that of Haidar, the Persians belong: the present dynasty of Persia deriving its descent from Haidar, a descendant of Ali. Ali himself is, by some of them, endowed with more than human attributes.—The S. believe in metempsychosis and the descent of God upon His creatures, inasmuch as He, omnipresent, sometimes appears in some individual person, such as their Imams. Their five subdivisions they liken unto five trees, with seventy branches; for their minor divisions of opinions, on matters of comparatively unimportant points of dogma, are endless. Yet, in this they all agree, that they consider the califs Abu Bekr, Omar, and Othman, who are regarded with the highest reverence by the orthodox Sunnites, as unrighteous pretenders, and usurpers of the sovereign power, which properly ought to have gone to Ali direct from the Prophet. For the same reason, they abominate the memory of the Ommayad califs, who executed Husain, a son of Ali, and they still mourn his death at its anniversary. They likewise reject the Abasside califs, notwithstanding their descent from Mohammed, because they did not belong to Ali's line.

SHIKARPU'R, the most important trading-town, and probably the most populous town, in Sinde, stands about 20 miles west of the Indus, half way between Multan and Kurrachi. The district in which it stands is so low and level, that, by means of canals, which are supplied from the Indus, it is flooded every season. Its climate, notwithstanding, is said to be not unhealthy. The inundated quarters are extremely fertile and produce great crops. Groves, orchards, and fruit-gardens surround the town; sugar-cane is largely grown. S. is situated on one of the great routes by the Bolan Pass from Sinde to Afghanistan, and the transit-trade to that country and to Khorassan is important. The bankers and financiers of S. are known and trusted from Astrakhan to Calcutta. S. is the chief town of the state of the same name, which has an area of 13,679 sq. m., and 693,259 inhabitants. Pop. of the town estimated at 30,000, 20,000 of whom are Hindus, and the rest Mohammedans.

SHI'LKA. See AMOOR.

SHILLING, the name of a money in use throughout many European states, partly as a coin, and partly as a money of account. In all probability, the name, as well as the thing itself, is derived from the Roman *solidus*, which, with other remains of Roman institutions, was adopted by the Franks and other Germanic nations. See PENNY, SOLIDUS. Others give more fanciful derivations, as from *schellen*, to ring, on account of the particularly clear ring of the coin, and from St Kilian, whose effigy was stamped on the shillings of Würzburg. The *solidus-shilling* of the middle ages has suffered various degrees of diminution in the different countries. Thus, the English silver shilling is $\frac{1}{20}$th of a pound sterling; the Danish copper one is $\frac{1}{96}$th of a ryks-daler, and $= \frac{1}{4}d.$ sterling; and the Swedish shilling is $\frac{1}{48}$th of a ryks-daler, $= \frac{1}{2}d.$ sterling. In Mecklenburg, Sleswig-Holstein, Hamburg, and Lübeck, the shilling is used as a fractional money of account (the $\frac{1}{16}$th of a mark, $\frac{1}{48}$th of a thaler), and as small silver change (each coin being a shade less in value than 1*d.* sterling). The French *sou* is another representative of the solidus. See POUND, MINT.

SHIN, LOCH, in the south of Sutherlandshire, is 18 miles long, and about one mile broad. The Shin Water, a famous trout-stream, carries the waters of the loch into Oikell Water. Loch S. abounds in common trout and salmon.

SHINGLES, flat pieces of wood used in roofing like slates or tiles. Such roofs are much used in newly-settled countries where timber is plentiful. The wood is chosen from among the kinds which split readily and straightly, and is usually some kind of fir. It is cut into blocks, the longitudinal faces of which are of the size intended for the shingles, which are then regularly split off in thicknesses of about a quarter of an inch.

SHIP (Ger. *Schiff* = *skiff*; from the root *skap-* or *skaph-*, to scoop, dig; Gr. *skaphe*, a trough, a boat) is a term applied with great vagueness to all large vessels; while under *shipping* would be included vessels of all sizes, excepting boats without decks. Among seamen, the expression is said to be limited to vessels carrying three masts, with a royal-mast surmounting each; but the development of steam-navigation, in which the largest vessels have sometimes only a schooner rig, must have gone far towards obliterating this distinction.

SHIP-BUILDING. See NAVIGATION; NAVIES, ANCIENT AND MODERN; and NAVY, BRITISH. From crossing a river or lake on a floating log, or on two or more logs fastened together raft-wise, the first steps towards ship-building were probably Canoes (q. v.), and Coracles (q. v.). The earliest Egyptian drawings shew boats constructed of sawn planks, and having sails as well as numerous oars. So far as can be learned from ancient sculptures, the galleys of the Mediterranean at the dawn of civilisation appear to have been open, at least in the middle portion; to have been built with keel, ribs, and planking, and to have been strengthened cross-wise by the numerous benches on which the rowers sat. Ships continued, however, to be generally of small draught, for they were beached every winter; and Cæsar mentions, as a noteworthy circumstance, that some of the long ships with which he invaded Britain could only approach the shore to such a point that the soldiers in disembarking were breast-high in the water. The Romans built their vessels of pine, cedar, and other light woods; but their ships of war were of oak at the bows, clamped strongly with iron or brass, for use as rams—a custom now curiously revived after 2000 years of disuse. According to Cæsar, the Veneti first built entirely of oak. The speedy oxidation of iron bolts and fastenings led to their supersession by copper and brass about the time of Nero. Before this time, the planks had been calked with flax, and the seams had been pitched. There is evidence to shew that in Trajan's reign

sheathing of lead fastened on with copper nails had been used as a protection for the timbers from the devastating insects of the Mediterranean. With the decline of Roman greatness came a new era for ship-building. The hardy Norsemen had chopping seas and Atlantic swells to fight with; their ships differed much from the stately galleys and quinqueremes of the empire. Far smaller, they were built more stoutly, with bluff bows, and a lug-sail which could be braced well up to the wind. The Norse ships must have been of considerable power, for there is good evidence that they had visited the coasts of the New World at an early period. We have, however, very little knowledge of the construction of these vessels, except that they had high prows and sterns to resist the waves, and that they were calculated for sailing in opposition to the galleys, which were for rowing. The introduction of galleys by Alfred, pulled by 40 and 60 oars, and twice as long, deep, nimble, and steady as the Danish ships, kept the latter in check; but it also checked the development of ocean-navigation, for the galleys were only fit for shore-service. The ships gradually increased in size. Hardicanute had a galley pulled by 80 oars; and contemporaneously, the Venetians are said to have built ships of 1200 to 2000 tons. William invaded England in miserably small sailing vessels; but large—indeed very large—vessels appear to have existed in the time of Richard I. John systematised ship-building by establishing a royal dockyard at Portsmouth. Large ships constructed for sailing only seem to have come into general use, together with the mariner's compass, in the beginning of the 14th century. One hundred and fifty years later, the addition of the bowsprit added much to the sailing-powers of vessels.

In Ellis's Collection of Letters there is one, dated 1419, from John Alcôtre to King Henry V., concerning a ship building at Bayonne for that monarch. This letter is curious, as shewing how many of the present terms then existed, and also that the 'Kynges schyppes' were of considerable dimensions (e. g., 'the stemme is in hithe 96 fete; and the post 48 fete; and the kele ys yn leynthe 112 fete.') Before this period, ships had been built strong enough to encounter even the whale-fishery. From this period the history of ship-building is resolved into the history of individual parts, for the main principles of wooden ships were already established. In Henry VII.'s reign, the cumbrous fourth mast began to be dispensed with; in that of his successors, shifting top-masts came into fashion, the lofty stems and sterns (which must have precluded sailing on a wind) fell gradually into disuse. Port-holes were invented at least as early as 1500. In 1567, there were cutter-rigged vessels in the British seas. In the century ensuing, naval architecture was much improved by Mr Phineas Pett, his son Peter, and by Sir Anthony Deane; but the best naval architects were not in England. Within the present century, the introduction of steam has led to the building of ships with finer lines, both for bow and stern. About 1836, iron was introduced as a material for ship-building, and is now employed almost equally with wood.

Adverting now to the actual art and practice of ship-building, the subject is divisible into two distinct portions—the theoretical, known as *Naval Architecture;* and the practical, called *Ship-building.* The naval architect designs the form of a ship with reference to the objects intended in her construction, to the speed required, powers of stowage, &c.; while the ship-builder works from his drawings, and gives practical effect to the theoretical design.

Naval architecture on a theoretic basis is of recent date, for, as in all cases, practical efforts, more or less in the dark, have preceded by many ages the theorems of the man of science; nor is it at present by any means an exact science. Results continually occur which take by surprise the best masters; and great as have been the strides both in theory and practice, many of the most successful ships have been but happy experiments. The laws of flotation and resistance are, of course, the foundation of the science, and for these we must refer to the articles on HYDROSTATICS and HYDRODYNAMICS; but very trifling changes in the shape of the body immersed, the position of its centre of gravity, &c., produce apparently disproportionate results on the sailing-powers of a ship. In regard to speed, the resistance is, theoretically, as the square of the velocity; but, practically, it increases in a greater ratio, since the water piles in a wave before the bows, and leaves a temporary hollow before it closes in at the stern. To avoid this wave at the bow, and give good steerage-power to the rudder, finely-pointed extremities are desirable; but if these points be too fine, they will cease to be self-sustaining in the water, and will detract from the general buoyancy of the ship, while they will tend to raise the centre of gravity above the metacentre. Apart from these considerations, the finer the build, the less are the stowage-power and steadiness. It will thus be seen how many points a naval architect has to take into account in designing the lines of a ship. It would be beyond the scope of an elementary article like the present to give the complicated rules by which the areas of sections, solid contents, and centres of gravity of ships are calculated; but it is necessary to say that they have to be computed with the utmost nicety. Theory has as yet failed to point out clearly what should be the proportions between the length, breadth, and depth of a ship; but the following principles may be stated as the results of experience:

An increase of length gives an increase of displacement of water, and therefore of carrying-power; if this be not desired, it allows of finer lines forward and aft, and consequently greater speed. It also increases the resistance to lee-way. The greater friction of the water on the longer sides does not appear to be material. Against the increase is to be set a diminished power of turning, tacking, and wearing. It also involves a more careful balancing of weights in the fore and after portions of the ship, for the momentum of a small weight may become large in a long vessel, from being such weight multiplied into the square of its distance from the ship's centre of gravity.

The increase of breadth gives greater stability to the ship, and, by allowing of more sail, indirectly greater speed; but directly, it increases the resistance to the water. Of course, greater breadth enables greater bulk to be carried. Depth is a question dependent on the seas to be navigated, the object for which the ship is intended, and many other reasons. It is to be borne always in mind that the consumption of stores on a long voyage will change the draught of a ship considerably. Practice has proved unequivocally that ships sail better for drawing more water aft than forward.

Passing now to the actual designing of vessels: the architect works on paper only; he has therefore to shew on a flat surface, for the builder's guidance, the exact position, curvature, and relief of every line and point in his proposed structure. He accordingly draws three plans, on each of which every point of the ship is traceable: the *sheer-plan,* shewing all lines of length and height;

the *half-breadth plan*, lines of length and breadth; and the *body-plan*, which shews breadth and height. From these combinations, the exact position of every point is determinable. Figures 1 to 3 shew those plans, called *construction drawings*, on the same scale for the *Great Eastern* steamship. The

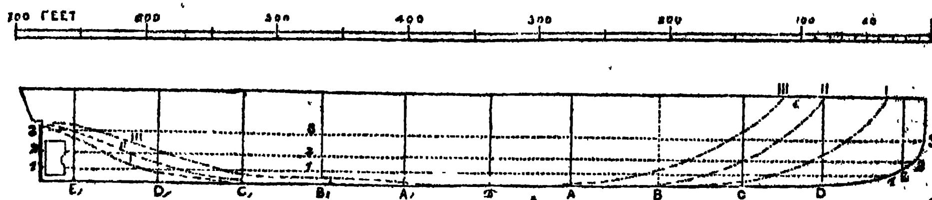


Fig. 1.—*Great Eastern*—Sheer Plan.

sheer-plan represents, in its outside line, a vertical plane through the keel. The dotted lines, 1, 2, 3, are the edges of supposed horizontal planes drawn at various heights. The curved lines, I, II, III, are the edges, as they would appear on the outer covering of the ship, of vertical planes drawn parallel to the central plane through the keel. The uprights, A, B, &c., A,, B,, &c., are the edges of supposed planes drawn at given distances from the line of greatest breadth X, at right angles to the plane

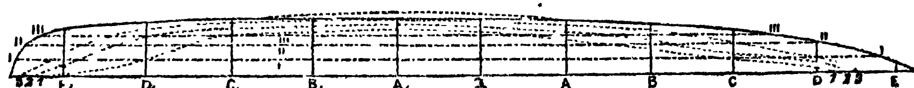


Fig. 2.—*Great Eastern*—Half-breadth Plan.

through the keel. The half-breadth plan represents one half of the ship's upper deck, as regards the black outer line; the horizontal, vertical, and cross sections of the sheer-plan appearing again under different conditions. The vertical longitudinal sections become straight lines parallel to the keel; the horizontal sections appear as curves taken at different heights on the vessel's sides. The body-plan is the ship looked at end-on; the outer line being her cross section at the line of greatest breadth, and the horizontal and vertical sectional lines appearing at right angles to each other. The lines on the left side correspond to the cross sections of the after-body (that is, the portion of the ship nearer the stern than the line of greatest width), and shew the curvature of the ship's sides towards the stern; while in a similar manner those on the right side shew the curvature up to the bow. Of course, in working-drawings from which ships are to be actually built, the scale employed would be very large; and instead of three or four sectional lines in each direction, a great number would be inserted for the guidance of the builder. With these three plans in hand, the workman has the exact position of every point in the ship's exterior coating exactly defined. Even the unprofessional observer need not strain his imagination greatly to clothe these flat plans with their dimensions of length, breadth, and depth, and to conjure up before his eyes the precise form of the goodly ship represented.

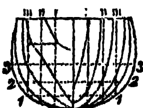


Fig. 3.—*Great Eastern*—Body Plan.

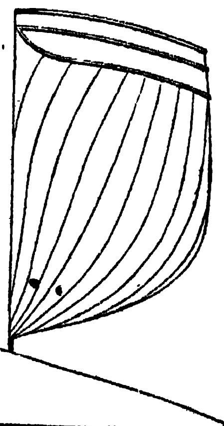


Fig. 4.—Clipper—*Lord of the Isles*.

Before leaving these plans, it is right to state that the *Great Eastern* is somewhat peculiar in her lines; few body-plans are so flat in the bottom; and on the other hand, she is unusually convex at the bow. In proof of this, fore-bodies of two celebrated vessels, and the half-breadth of their bows, are shewn in figs. 4, 5.

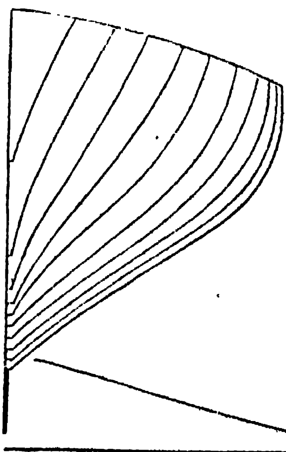


Fig. 5.—Yacht—*America*.

With the completion of the construction drawings the work of the naval architect ceases, except as regards any necessary subsequent supervision.

It is then to be decided of what material the ship shall be constructed. Of the many woods employed—oak, teak, and fir, are those most commonly used; or iron may be resorted to; or, again, the ship may be of wood and iron combined. The building of a wooden and of an iron ship are quite distinct operations, the requisite strength being obtained in a different manner in each case. It is necessary, therefore, to consider separately the principles of wooden ship-building and iron ship-building; and as the most time-honoured, and as yet the most general process, we will first deal with the art of the shipwright who forms the vessel of timber.

Wooden Ship-building.—The first process is to develop, or 'lay off,' on the *mould-loft floor*, certain full-size working sections of the required ship. These are taken from the construction drawings, and are built up of planks. The combinations of these pieces of plank shew the shape in which the several timbers will have to be cut, to impart the necessary curvature and strength.

The next step in actual construction is to prepare the slipway, by raising a number of strong blocks of timber a short distance apart, on which the keel shall rest, and which shall sustain the entire ship when built. These blocks are composed of several pieces, and it is of the utmost importance that their upper surfaces be in an exact line. That line is made at an inclination of $\frac{5}{8}$ths of an inch to a foot; and the keel of the ship, and the ship itself, have consequently that slope to the horizon while building. This inclination is for the facility it affords in launching the completed vessel. On the blocks is laid the keel, which may be called the back bone, and is certainly by far the most important timber in the ship. From it start the ribs, the stem, and the sternpost; so that any serious accident happening to the keel, involves the breaking up of the whole structure. It is therefore made of great strength, being, in a first-rate, no less than 20 inches square. The material is usually elm, on account of its toughness, its non-liability to split, and the fact that immersion in sea-water preserves it. The pieces of which it is composed are united by the strongest kind of scarph joint (see CARPENTRY).

To afford a firm footing for the planking of the ship, a rabbet, or angular groove, is cut in the side of the keel, as in fig. 6. Here the side *a* represents the rabbet, as usually cut in the merchant service; *b*, as made in the royal navy. The advantage of the latter system is, that thicker planking can be worked in, affording better lateral support to the keel, and that there is less disruptive leverage when the ship takes the ground. The *false keel* is placed below the true keel, after all the bolting through the latter has been accomplished. It consists of elm, 4 to 6 inches thick; and is but lightly secured, in order that if the ship runs ashore, the false keel may readily come off, and let the vessel go free. It is so put on that its joints come midway between the scarphs of the keel. To fix it, it is necessary to knock away, one by one, the blocks on which the keel rests, which is done at the time the weight of the ship is transferred from the blocks to the cradle resting on the bilge-ways. See LAUNCH.

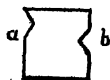


Fig. 6.—Rabbets of the Keel.

What the keel is to the bottom, the stem and sternpost are to the bow and stern of the ship, forming the keys from which the ends of the planking (technically called the 'butts') and all longitudinal supports start. Each is, of necessity, of great strength, and rises from the respective extremities of the keel. The *stem* is fastened to the keel by scarphs, called the *boxing*, and within it is the *apron*, and perhaps a false-post also, to impart additional strength, as shewn in fig. 7. The *stern-post* has to bear the rudder, and is usually made, when possible, of one piece of timber; it is united to the keel by a mortise and tenon joint. In large vessels, an inner post is sometimes worked on to the sternpost for extra security. In screw-steamers, there is a second sternpost, forming the forward support for the screw.

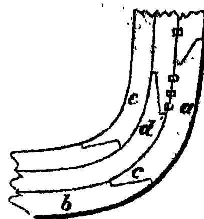


Fig. 7.—Stem.
a, stem; *b*, keel; *c*, boxing *d*, apron; *e*, stantion.

The extreme outlines of the ship being now established, the builder proceeds with the timbers to form the bottom and sides, which together constitute the *frame*, corresponding to the ribs in an animal. The ribs form the sides of the ship, and are placed at from 2 feet 6 inches to 3 feet 9 inches from centre to centre. Above the water-line, the spaces between them are filled in solid with timbers of equal thickness. For this purpose, in the midship-body the keel is crossed at right angles, or nearly so, by certain timbers which form the *floor*. One mode of arranging the component pieces is shewn in fig. 8. The

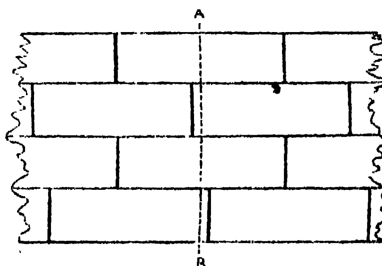


Fig. 8.—The Floor.
A, B, Middle Line of Keel.

keel is let about three-fourths of an inch into a groove running along the bottom of the floor, while above the floor, the *keelson* is a massive timber, parallel to the keel. The keel and keelson are bolted firmly together by long copper bolts, which pass through the timbers of the floor, and completely fix the latter. Beyond the floor-pieces, and forming the curvature of the sides, are the *futtocks*. The heels of these timbers rest on the butts of the floor-timbers. There may be a greater or less number of futtocks, according to the size of the ship. On the heads of the uppermost futtocks, rest the heels of the *top-timbers*, which, with any *lengthening pieces* which may be necessary to give height, form the complete ribs. The floor, futtocks, top-timbers, and lengthening timbers are united to each other by dowels and bolts. As an additional strengthening to the frame in large vessels, *side* or *sister keelsons* are bolted on to the floor or futtocks, a short distance on each side of the principal keelson. Fig. 9 shews a section of a complete rib, with the several parts. Having now formed the ribs for the midship-body, in which they are placed at right angles to the keel, it is necessary to consider their form in the fore and after cant-bodies. Here the right angle can be no longer maintained between the timbers and the keel, since they have to be

gradually rounded through a quadrant of a circle until the foremost timbers, on each side of the stem, face to the front. This arrangement involves

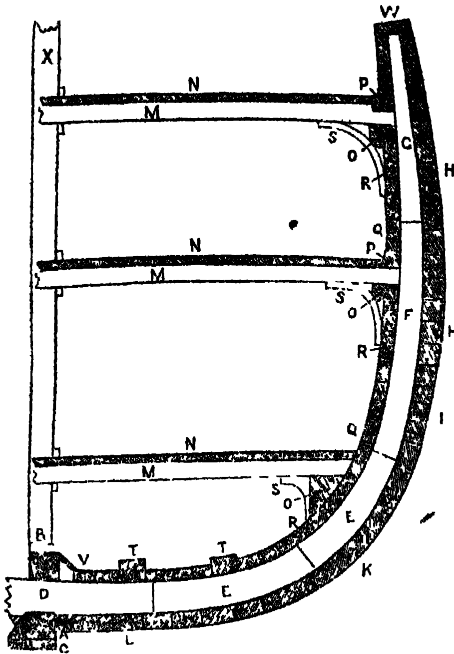


Fig. 9.—Rib and Decks in section.

A, keel; B, keelson; C, false keel; D, floor; EE, futtocks; F, top-timber; G, lengthening piece; HH, wales; I, diminishing planks; K, bottom planks; L, garboard strakes; M, beam; N, deck; O, shelf; P, waterway; Q, spirketting; R, clamps; S, knees; T, side-keelsons; V, limber strakes; W, rough-tree rail; X, mast.

the ribs being set at a diminishing angle to the keel, as seen in fig. 10. The foremost cant-timbers are the *knightheads*, forming, with the stem, a bed for the bowsprit; next to these are the hawse-timbers, through which the hawse-holes are pierced. In order that the cant-timbers may sit firmly on the keel, they are made narrower at the bottom than at the top. But the canting forward or aft is not the only peculiarity of the cant-bodies; for at its extremities the ship becomes sharp downwards as well as endways. It consequently ceases to be practicable to have floors of any flatness across the keel. The half-floors and

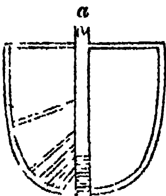


Fig. 10.—Cant-body, seen from above.
a, keel.

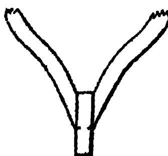


Fig. 11.

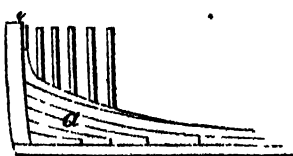


Fig. 12.—Deadwood (*a*).

first futtocks are made in one piece, slanting more directly upwards; they pass rapidly from their flat position, through that shewn in fig. 11, to the state called *deadwood*, shewn in fig. 12. The deadwood consists of timbers worked above the keel, and of the same width with it, and is practically a heightening of the keel. The deadwood imparts a wedge-like shape to the vessel. In screw-steamers, the after-deadwood is almost wholly cut away to form the aperture for the screw.

Having built the main skeleton, as it were, of our ship, the skin is the only thing remaining to complete its exterior. This is represented by thick wooden planking, fastened on to the ribs, the lowest layer pressing into the rabbet of the keel, and the highest reaching to the uppermost bulwark. The thickest planking is at the bends or wales, marked H in fig. 9, where it varies from $4\frac{1}{2}$ inch in small vessels to 10 inch in ships of the first class. Very thick plank is technically termed *thickstuff*. Below the wales, the planks are reduced gradually in thickness: those first occurring are called the 'diminishing plank,' still of oak: under this, on the rounding, fir is used under the name of 'bottom plank,' except the last five or six planks from the keel, which are of elm, and are called 'garboard strakes.' Every complete line of planking from stem to stern is styled a *strake*. As the trees from which thick planks are cut are parts of cones—i. e., with the plank much wider at base than at top—the planks are worked alternately as in fig. 13, which is called 'top-and-butt.' Other forms

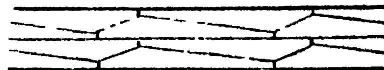


Fig. 13.—Planking; top-and-butt.

of working are 'fair-edge' and 'anchor-stock,' which do not call for particular description, but are less economical than top-and-butt. The planks are fastened to the ribs by bolts; one through each rib constituting 'single fastening;' two, 'double fastening;' and one and two alternately, 'single and double fastening.' 'Dump fastening' consists in using alternately one bolt and one dump or bolt-nail, which is hammered to a head without and within. Wooden treenails are, however, frequently employed, as less in weight than copper, and less liable to split the wood. The comparative utility of wood and copper fastenings for the strakes, is still a disputed point.

In a well-constructed ship, the filling in of the timbers to a level above the water-line should be so accurately formed that she would float without her planking; but when the latter has been well caulked, it is certain that it adds greatly to the dryness of the ship, while it aids materially in binding her several parts together.

At frequent intervals across the ship, and at the heights of the several decks, are inserted the *beams*, which are solid masses of timber, either in one piece or scarphed. These prevent the ship from collapsing, and at the same time support the decks. The beams and decks are shewn at M and N respectively in fig. 9. To support the beams on each level, a strong timber or *shelf* is worked round the interior of the ribs. Above the ends of the beams, similar timbers or *waterways*, though somewhat smaller, are worked round the inner frame. The inside is planked above the water-line similarly to the outside. The planks above the waterways as high as the ports or windows are *spirketting* (Q), those below the shelf and above the ports are the *clamps* (R). The decks and beams curve upwards at the middle, forming a very depressed arch, partly for drainage, and, in men-of-war, partly to counteract the recoil of the guns. When weight is piled on

the deck, the tendency is consequently to force the ship's sides outwards. This it is endeavoured to overcome by using large knees or iron brackets, which maintain a direct connection between the beams and ribs (see S in fig. 9). At the bow and stern, additional rigidity is given by the ribs being connected by *breast-hooks* and *crutches*. When the beams are well established, the hatchways and mast-holes are traced out with their *coamings* resting on *carlings*, which are cross-pieces between the beams, and their *head-ledges* resting on the beams themselves. This done, the deck is laid down of straight-grained hard wood; the planks are calked and pitched between, until the deck or platform becomes perfectly water-tight.

Along the inside of the bottom are laid the *sister keelsons*, or *side keelsons*, if the ship be large, and all spaces are filled up with planking, except the width of one plank next the keelson on each side, which is left for a drain to carry all refuse-water to the foot of the pumps. A plank called the 'limber' is placed across this gutter, to keep solid rubbish out. The inside planking next the limbers goes by the name of the *limber-strakes*.

We have now completed the principal parts of the hull of a wooden ship. There are, of course, numerous matters of detail, as bitts, channels, capstans, &c., all of which are provided for while the ship is building, but into the details of which we cannot enter.

Iron Ship-building.—Iron affords in many respects a better material for ships than wood. In the first place, the same strength may be obtained with less weight; secondly, iron plates can be rolled to any curve, so that the combinations necessary for strength in wooden vessels can be avoided. Ships are built of boiler-plate riveted closely together. The denominations of the several parts in a wooden ship are adhered to. There is the keel, formed by some makers boxwise, but more commonly

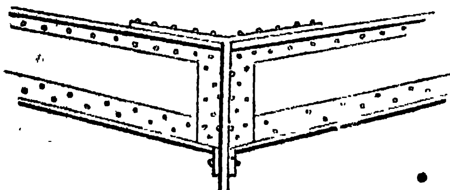


Fig. 14.—Keel of an Iron Ship.

in the simpler shape shewn in fig. 14; from it rise the ribs, which are really girders, formed of plates, following the curve of the side. Keelson and side keelsons rise within, but rather for sustaining the cargo off the ship's bottom than for the strengthening purposes to which they are applied in wooden vessels. Outside the ribs the strakes are riveted on in large plates, varying in thickness according to the strength required from about $\frac{14}{16}$ths to about $\frac{5}{16}$ths of an inch. In some ships, similar plates are laid over the inside of the ribs, thus forming two water-tight skins for the vessel's flotation, the space between being divided into compartments by the ribs themselves. Firmly riveted to the ribs, which they brace together while they prevent compression, are the iron beams, usually flat-headed T-shaped, as in fig. 15. Resting on these, and fastened to them, is a thin plate or deck of iron, and over that wooden planking to form

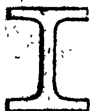


Fig. 15.—Section of T-shaped Beam.

the actual deck. The waterways are of iron. In most large iron ships, there are water-tight bulk-heads extending completely across the vessel, and dividing her into separate compartments, a few of which suffice to float the ship even if the others from any accident become filled with water. A framework is fastened to the sides and bottom, and a diaphragm of iron plate stretched within it to form the bulk-head. Except in shape, an iron ship differs little from a tubular bridge, and as she can be strengthened to any degree by uprights and cross-trees, it follows that the parts of an iron ship can be made to afford far more mutual support, and therefore more strength, than those of a wooden one. Comparative durability is a separate question; but the preference is believed to rest with iron, if proper precaution be taken to prevent rust.

Ships of Iron and Wood conjointly.—The French, far more than ourselves, have introduced iron into timber-ships, particularly for the beams, where the gain, for strength, lightness, and cross-tying, is unquestionable. They use iron plates, also, instead of inner planking with advantage, as saving space and weight.

In war-ships, the combination of iron and wood is mainly limited to iron-plated ships. These are either built with a wooden frame, outside which massive plates of iron are riveted, or with a powerfully cross-braced iron frame, on which a coating of perhaps 20 inches of timber is worked as a backing for the defensive iron armour. These vessels have of late occupied much attention, several specimens of each sort having been tried. The armament may consist of a broadside battery, or of heavy guns in revolving cupolas. See TURRET SHIPS.

Internal Arrangements of a Ship.—Whether the vessel be of iron or wood, her internal design must follow the purposes for which she may be required. As a general principle, the ship is divided into a greater or less number of platforms, floors, or DECKS (q. v.), devoted to various purposes. In a ship-of-war, a large portion is required for the men, the remainder being occupied by war-like stores, provisions, and coal. In a merchant-vessel, far less space is allotted to the crew, and far more to the cargo. In every ship, a space must be provided for the carriage of provisions and water proportionate to the number of the crew and the intended duration of voyages. A steamer differs from a sailing-vessel in requiring a large compartment amidships to be kept clear, without being crossed by decks, for her engines and boilers. As at this part the vessel loses the lateral hold of beams, and the longitudinal ties of decks, the sides have to be otherwise strengthened. In screw-steamers, to the height of the boss of the screw above the keelson, a tunnel, known as the *screw-alley*, has to be kept open for the shaft of the screw from the engine-room to the stern. This tunnel necessarily narrows as it enters the dead-wood, until it affords little more room than the actual shaft demands. The heavier portion of a cargo, as coal and water, is carried immediately above the keel, so that the centre of gravity may be as low as possible, and for the same reason the engines and boilers are placed as low down as practicable. For various details concerning the formation and arrangement of ships, the reader is referred to detached articles descriptive of the respective portions, as DECKS, MASTS, CAPSTAN, CHAINS, CHANNELS, HOLD, KEEL, &c.

SHIP-MONEY, a tax had recourse to in England at various times, but especially in the reign of Charles I., for the equipment of a fleet. In 1007, when the country was threatened by the Danes, a

law was made obliging all proprietors of 310 hides of land to equip a vessel for the protection of the coast. Elizabeth, at the time of the threatened Spanish invasion, required the various ports to fit out a certain number of ships at their own charge; and so great anxiety was shewn by the public for the national defence, that London and some other ports furnished twice as many vessels as had been demanded. It was in 1626 that Charles first had recourse to an impost of this description, requiring each of the maritime towns, with the assistance of the neighbouring counties, to arm a given number of vessels, 20 being required from London. In 1634 the tax was extended over the whole kingdom. A general spirit of resistance was immediately aroused, not so much in consideration of the amount of the tax, as of the objectionable feature, that it was imposed by the arbitrary authority of the king alone, which had come to be regarded as an unwarrantable stretch of the royal prerogative. In 1637, the celebrated John Hampden, a gentleman of property in Buckinghamshire, resolved to confront the power of the government by disputing the legality of this exercise of the prerogative, and resolutely refused payment of the impost, an example in which he was followed by nearly the whole county to which he belonged. He was prosecuted in the Exchequer Chamber for non-payment, and his trial was watched with great interest and anxiety by the nation on account of the constitutional point involved in it. The judges, four excepted, pronounced in favour of the crown; but the trial had the effect of thoroughly arousing the public mind to the danger of the imposition of taxes by the royal authority alone. The Long Parliament, shortly after its meeting in 1640, voted ship-money illegal, and the sheriffs and others who had been employed in assessing it or collecting it to be delinquents; and cancelled the sentence against Hampden.

SHIPPING. See Merchant Ship. Act in Supp.

SHIP-WORM. See Teredo.

SHIPWRECKS, in ancient times, were deemed the property of the crown, but by a statute of Henry I., the harsh consequences of this law were avoided whenever any person escaped alive out of the ship; and in Henry II.'s charter it was declared that if either man or beast escaped alive, the goods should remain to the owners if claimed within three months; and the courts of law still further refined away all these harsh rules. Many nice distinctions have been made as to what goods constitute wreck, which is distinct from goods floating. See Flotsam. By the recent Merchant Shipping Act, 1854, which extends to the United Kingdom, the Board of Trade has the superintendence of all matters relating to wreck, and to jetsam, flotsam, and ligan. Receivers of wreck are appointed for various districts, and have power to summon assistance. When wreck is found by any person, he must give notice to the receiver of wrecks, and if nobody claim the property within a year, it is sold, and the proceeds, after paying salvage and other such expenses, are paid into the Exchequer. Persons plundering wreck are guilty of felony, and may be punished with three to fourteen years' penal servitude; and any person exposing false signals to cause wreck, may be sentenced to penal servitude for life.

The following results are given in the Abstracts of Returns made to the Lords of Committee of Privy Council for Trade, for the year ending 31st December 1863. The number of wrecks and casualties near the coasts of the United Kingdom for 1863 was 1664. The annual average number for the nine years ending 31st December 1863 is 1339. It is, however, stated in the Report accompanying the abstracts that the last five years of the period ending with 1863 were exceptionally stormy, January, February, and November 1861 having added upwards of 460 to the casualties of that year; while the heavy westerly gales in the beginning and end of 1863 added 930. During the five years ending 1858, the total casualties are stated at 5594, giving a mean of 1118⅘; while for the five years ending 1863 they were 7441, giving a mean of 1488⅕. The maximum occurs in 1863; the minimum, 987, in 1854. Of the total in 1863, 331 arose from collision; 1333 from other causes; and of this 1333, the result was total loss in 503 cases. The following table may be interesting:

CASUALTIES FROM CAUSES OTHER THAN COLLISION.

Year.	Total Loss—from: Stress of Weather.	Carelessness.	Defect of Vessel.	Various Causes.	Cause Unknown.	Partial Damage—from: Stress of Weather.	Carelessness.	Defect of Vessel.	Various Causes.	Cause Unknown.	Total.
1859	298	84	42	70	83	808	97	42	88	5	1067
1860	278	103	49	40	6	367	110	49	72	7	1081
1861	302	89	48	49	25	424	102	56	75	1	1171
1862	242	72	25	96	20	386	115	42	144	8	1150
1863	332	61	31	65	14	550	115	30	126	9	1333
	1452	409	195	320	98	2035	539	219	505	30	5802

From Table No. 6 of the Abstracts of Returns quoted from, it appears that the greatest number of casualties, on an average of the five years ending with 1863, has taken place on the east coast of Great Britain— i. e., between Dungeness and Duncansby Head; and by Table 21, it is shewn that the casualties most fatal to life have occurred in the Irish Sea. The most disastrous wind is the south-west, against which is placed on the above average 801 cases; while the fewest, 224, stand against the north-north-east.

Of the total casualties, 1664, in 1863, it will be seen that 882 are attributed to 'stress of weather;' but of this number it seems that only 780 occurred under such force of wind as might not probably have been overcome by good seamanship and a sound vessel. Table 18 shews that the sands on the south-east of England are the parts of the coast on which most casualties occur.

SHIRA'Z, a celebrated city of Persia, and the capital of the province of Fars, in lat. 29° 41′ N., long. 52° 38′ E., was formerly a very flourishing city, and the ordinary residence of the Persian monarchs, but is now singularly divested of its ancient splendour. It is situated in a wide plain, on one of the limestone ledges which shoot out from the great West-Persian mountain system, 112 miles from the Persian Gulf, and 35 south-west of the ancient Persepolis (q. v.). It is enclosed by walls nearly four miles in circumference, and, previous to the great earthquakes which have repeatedly laid it in ruins, contained many splendid mosques, bazaars, caravansarais, and other public buildings. The houses, which are mostly built of stone, are superior in appearance to those of most other Persian towns; and the adjoining portion of the plain is of exuberant fertility, and is laid out in vineyards and in rose-gardens of great extent, which, at the season of bloom, emit a fragrance, which may be felt at a great distance. The principal manufactures are silk, cotton, and woollen goods, cutlery, firearms, glass, and earthenware, as well as wine (or rather liqueur) and oil of roses. The lapidaries are famous throughout Persia. The trade of the town is transacted in the *Bazar-i-Wukeel*, which is about half a mile long by 40 feet wide, and affords accommodation to

several hundred shopkeepers. S. carries on trade with Yezd, Ispahan, and Bushire, from the last of which towns it receives Indian and European goods. The city was founded in 697 A.D., and from its beautiful situation and charming climate, became a favourite resort of the Persian princes; but a destructive earthquake in 1812 laid a large portion of it in ruins, and another in 1824, which cost the lives of 4000 of the inhabitants, completed the wreck of its prosperity. It was, however, rebuilt, and had attained a pop. of 40,000 (its pop. previous to 1812 having been almost 60,000), when a third and more terrible visitation of this destructive agent in April 1853 laid almost the whole town again in ruins, and caused the death of 12,000 people. It has since been partially rebuilt in a somewhat inferior style, and its pop. is now estimated at 30,000. It is celebrated for the number and eminence of the scholars and poets to whom it has given birth; chief of these is Sibuyah, the first of Arab grammarians; Hafiz (q. v.), the 'Anacreon' of Persia, whose tomb is half a mile north-east of the Ispahan gate; and Saadi (q. v.), whose mausoleum is 22 miles to the north-east.

SHIRE (Sax. *sciran*, to divide), a term which seems to have originated in the 8th c., and is applied to the districts, otherwise called counties, into which Great Britain is divided. A considerable number of the counties of England, as Kent, Essex, Surrey, Norfolk, Suffolk, were formed out of the petty kingdoms of the Anglo-Saxons, which, with the advancing tide of centralisation, were gradually becoming consolidated into one great kingdom. As early as 800, an entry in the Saxon Chronicle relates that kings had ceased to reign among the *Hwiccas* (the inhabitants of the district afterwards known as Worcestershire), and that they were governed by an ealdorman acting under Cynwulf, king of Mercia. This substitution of ealdormen (or earls) for kings marks the gradual organisation of the counties. It was sometimes found convenient to split up a kingdom into several shires. The civil, military, and judicial head of the shire was the ealdorman, whose office was not necessarily hereditary, though it had sometimes a tendency to become so. Twice a year he held the shire-mote, in which he and the bishop presided with equal jurisdiction. Among other questions which would come before the shire-motes were those that related to the boundaries of the respective shires. As a border thane pushed his occupation towards the frontiers of the shire to which he belonged, and came into collision with the occupants of the neighbouring shire, questions necessarily arose which could only be settled by a compromise arranged by the two shire-motes, and these compromises may account for the irregular jagged boundaries which separate shire from shire, and occasional isolation of particular portions. Yorkshire, Durham, Cheshire, and Worcestershire derived their name from their ancient bishoprics. Various shires which had once an existence in the north, as Norhamshire, Islandshire, Hexhamshire, Hallamshire, Bamboroughshire, have merged into others. The term shire is nearly synonymous with county, yet not quite so, as there are certain counties with whose names the affix 'shire' is never used. One explanation which has been given of this usage is, that the object of the addition of the syllable 'shire' is to distinguish the county from the town of the same name, and that it is therefore only applicable to counties bearing the same name with their county town. Another explanation is, that shire being a word of Anglo-Saxon origin, is not properly applied to any of the English counties except those which formed part of the larger Anglo-Saxon kingdoms. Neither of these reasons are exactly correspondent with the actual usage, by which shire terminates the names of all the English counties except the following: Northumberland, Cumberland, Westmoreland, Durham, Norfolk, Suffolk, Essex, Sussex, Middlesex, Kent, Surrey, and Cornwall. In Cheshire, we drop the final syllable of the town of Chester. Berkshire, Shropshire, and Hampshire are never used in their simple form, though sometimes abbreviated into Berks, Salop, and Hants. Shire is applied to all the Welsh counties except Anglesea.

In Scotland, the English tendencies of the sovereigns from the time of Malcolm Canmore to the war of succession, and the tide of immigration from the south, brought in, among other innovations, the division into shires. Its introduction seems to have begun early in the 12th century. Twenty-five shires or counties are enumerated in a public ordinance of date 1305. Nearly all the counties of Scotland may receive the terminal addition of shire. It is not applied to the island county of Orkney, and seldom to the counties of Bute and Caithness. Kirkcudbright is neither a shire nor a county, but a Stewartry. See STEWARTRY. The Irish counties are not generally called shires.

In England, south of the Tees, there was a subdivision of the shires into *hundreds*, which originally, in theory at least, seem to have been districts inhabited by 100 or 120 families, and were in some localities called *wapentakes*, these hundreds or wapentakes being further subdivided into *tythings*, inhabited by ten free families; and it became incumbent on every one to be enrolled in a tything and hundred for the purposes of civil government. In some of the larger counties there was an intermediate division to which that into hundreds was subordinate. Yorkshire had and still has its *Ridings* (q. v.), Kent had its *Lathes*, and Sussex its *Rapes*. The division into hundreds and tythings never penetrated into the four northern counties of England, or into Scotland, where the *ward* and *quarter* were the immediate subdivisions of the county.

England possessed three *counties palatine*—Cheshire, Lancashire, and Durham—of which the earls formerly possessed all the judicial and fiscal powers of the crown, all now annexed to the crown (see PALATINE). Similar privileges belonged to the earldom of Strathern in Scotland.

SHIRÉ, a river of South-eastern Africa, has its source in Lake Nyassa, from which it issues in lat. 14° 28′ S., and after a southerly course of 250 miles, joins the Zambesi. It flows through a cotton and sugar producing country of vast extent, is 80 to 150 yards broad, 12 feet deep, and never varies more than 2 or 3 feet from the wet to the dry season. Its current travels at the rate of 2½ knots an hour. The navigation is obstructed by cataracts over a space of 35 miles, in which it falls 1200 feet.

SHIRWA, or TAMANDUA, a lake of South-east Africa, north end 30 miles south-east of Lake Nyassa, lat. of centre 15° 10′ S., long. 35° 40′ E. It is of an oval shape, tapering to the south; length, 60; breadth, 10 to 23 miles, and 1800 feet above the sea-level. It is surrounded by elevated land. On the west, between the lake and the River Shiré, Mount Zomba rises to 7000 feet. Several small rivers enter the lake on the south and west.

SHI'SHAK (in hieroglyphs, Shashank, the Susak or Susakim of the Septuagint, and the Shishak of the Hebrew version, the Sesonchosis or Sesonchis of Manetho), the name of several monarchs of the 22d, or Bubastite Egyptian dynasty, supposed to have descended from foreign settlers in Bubastis, and to have been of Shemitic origin. The kings

of this name were S. I., the first monarch of the dynasty, whose name is found in the portico built by the Bubastite dynasty at the great temple of Karnak, and on several statues of the goddess Pasht, which probably came from Luxor. Jeroboam fled to S. from the pursuit of Solomon, who wished to kill him, and lived there during the lifetime of Solomon. On the death of this monarch, Jeroboam quitted Egypt, and contended with Rehoboam for the possession of the crown. This struggle caused the division of the kingdom of David into two states, that of Israel and Judah. In the fifth year of Rehoboam, S. marched to Jerusalem with an army of 12,000 chariots, 60,000 cavalry, and an innumerable number of infantry, composed of Troglodytes, Libyans, and Ethiopians. He took the city, the treasures of the temple, and all the gold bucklers which Solomon had made. The conquest of Jerusalem is found recorded on the monuments of Karnak, on which S. I. is represented dragging before the god Ammon three files of prisoners, inscribed with various names of places, amongst which are Judæa, Mageddo, Ajalon, Mahanaim, and other towns taken by S. in his line of march.

SHITTIM-WOOD. It is not certain what kind of wood is meant by this name in the Old Testament. The Ark of the Covenant was made of it, and probably it was a kind of wood distinguished both for beauty and durability. It has generally been supposed to be the wood of the *Acacia Nilotica*, which, however, is deficient in both these qualities. Another supposition is, that the wood of a species of olive is meant, *Olea similis*, which possesses them both, and is particularly remarkable for its durability.

SHIVES, a name used by cork-cutters to designate the small bungs used to close wide-mouthed bottles, in contradistinction to the phial-corks used for narrow-necked bottles.

SHO'A, a kingdom of Africa, the most southern division of Abyssinia, in lat. 8° 30′ -10° or 11° N., long. 38°—40° 30′ E. Its boundaries, however, are by no means fixed, that on the W., where S. is bordered by the Galla tribes, being specially variable. An extensive tract in the east of the kingdom, between the capital, Ankobar, and the river Hawash is called Efat. The character of the country, and the condition of the people, are described under ABYSSINIA (q. v.).

SHOCK, COLLAPSE, AND REACTION. It is well known that some forms of injury, as, for example, a blow on the pit of the stomach, may occasion death without leaving any visible trace of their operation in the body; and, indeed, life may occasionally be destroyed even by sudden and powerful mental emotions. In such cases as these, death is said to result from shock, the actual cause of death being the sudden arrest of the heart's action, consequent on the violent disturbance given to the nervous system. Instead of actual death, the condition known as *collapse* is more frequently induced, in which the patient lies in a state of utter prostration, and apparently on the verge of dissolution. The face, and even the lips, are pale and bloodless; the skin is cold and clammy, and drops of sweat are often seen on the forehead. The features are contracted, and there is great languor in the general expression. There is extreme muscular debility, and the sphincter muscles sometimes relax, so that there is involuntary discharge of the contents of the bowels and the bladder. The pulse is quick, and so feeble as often to be almost imperceptible, and the respiratory movements are short and weak, or panting and gasping. The patient is in some cases bewildered and incoherent, in others drowsy, and sometimes almost insensible. Nausea and vomiting, with hiccup, are not unfrequent symptoms; and in the case of children, convulsions are often present.

When a person recovers from a state of collapse, he passes into a condition termed *reaction*, which often lasts for several hours. The first symptoms of this favourable change are improvements in the state of the pulse and the respiratory actions, recovery of the power of swallowing, an increased temperature, and an inclination to move from the supine position to one side. A slight degree of feverishness then often ensues, after which the skin becomes moist, the patient falls asleep, and awakes convalescent. As a general rule, the longer the symptoms of reaction are delayed, the greater is the danger, and if several hours pass without any sign of the commencement of reaction, there is little hope of recovery. If the reaction is imperfectly developed, a condition may supervene which is known as 'prostration with excitement,' which may terminate either fatally or favourably, and into the symptoms of which our limited space will not allow us to enter further than to remark that a peculiar delirium, closely resembling *delirium tremens*, is most commonly present.

The principal causes of collapse (as given by Mr Savory in his article 'Collapse, and the General Effects of Shock upon the System,' in Holmes's *System of Surgery*) are:

'Injuries sudden and severe, or extensive, as contused and lacerated wounds, involving a considerable amount of texture—the crushing of a limb, for instance. Burns present familiar and striking examples of extreme collapse, produced by this cause. Under this head, too, come capital operations. Injuries of very important organs, as the liver or other of the viscera, or of the joints, or other organs abundantly supplied with nerves. Pain alone, when intense and protracted, has proved fatal in this way; and it appears in a case related by Sir A. Cooper, that sudden relief from great agony was attended by the same untoward result. Certain poisons operate in this manner, depressing the system so suddenly and severely as to produce a state of collapse; tobacco, for example; and drastic purgatives have in some cases induced a similar condition.'

The effects of shock are aggravated by loss of blood; and hæmorrhage alone, if sudden and profuse, will produce collapse. General debility and old age favour the influence of the shock, and much depends upon the idiosyncrasy of the patient; an injury which will produce no apparent effect on one man, often producing a serious and persistent impression on another.

The following are the most important points in regard to treatment: The patient should be kept in a horizontal position, with the head on the same level as the body, and he should not be raised till decided symptoms of reaction appear. The best stimulus is brandy, given in the form of hot brandy and water. 'Its effects,' says Mr Savory, 'are most certain and decided, and it suits the stomach best. It will remain when all other stimulants are rejected. The state of the circulation and the temperature are the guide to its use. If no effects are apparent after an ounce or two have been swallowed, it is very questionable if any advantage will be gained from a larger quantity.' At the same time, heat should be applied to the pit of the stomach and the extremities, by means of hot flannel, hot-water tins, or, in their absence, bottles containing hot water, and other appliances. Nourishment, in the form of beef-tea, should closely follow the stimulants; the two may be combined

with the greatest advantage, and as the system rallies, the latter may be entirely replaced by the former.

In those cases in which a patient is in a state of extreme collapse from an injury requiring a capital operation, such as the amputation of a limb, the operation should be performed as soon as his condition will admit of it; and although it should not be undertaken while the prostration is extreme, it is not necessary, or even advisable, in Mr Savory's opinion, to wait for complete reaction: and this is the opinion of most of our best surgeons. Moreover, in these cases, the use of chloroform is not expedient; for, in the first place, it cannot be safely administered to a patient so depressed; and, secondly, the chief reason for its employment is wanting, for a person in a state of collapse is comparatively insensible to pain. For further information on this subject, the reader is referred to Travers *On Constitutional Irritation*, and to the excellent article of Mr Savory, from which we have freely borrowed.

SHODDY formerly meant only the waste arising from the manufacture of wool; it now has a wider and much more important signification, and is almost wholly understood to mean the wool of woven fabrics reduced to the state in which it was before being spun and woven, and thus rendered available for remanufacture. Woollen rags, no matter how old and worn, are now a valuable commodity to the manufacturer; they are sorted into two special kinds, the rags of worsted goods and the rags of woollen goods, the former being made of *combing* or long-staple wools, and the latter of *carding* or short-staple wools. The former are those properly known as *shoddy*-rags, and the latter are called *mungo*. Both are treated in the same way; they are put into a machine called a *willey*, in which a cylinder covered with sharp hooks is revolving, and the rags are so torn by the hooks, that in a short time all traces of spinning and weaving are removed, and the material is again reduced to wool capable of being reworked. It was formerly used as a means of adulteration and cheapening woollen cloths, but it is now found of greater advantage in making a class of light cloths adapted for mild climates and other purposes.

The name is a purely technical one, which has arisen amongst the Yorkshire spinners, and is derived from *shed*, the term having been formerly applied by the operatives to the *flue* or waste shed or thrown off in the process of spinning. See WOOLLEN MANUFACTURES.

SHOEING OF HORSES. In olden times, horses generally went unshod, as they now do in many eastern countries; but our Macadamised roads and paved streets, our fast paces and heavy loads, would speedily wear away the stoutest hoofs, and a rim of iron has accordingly been long in use as a protection. In style and pattern, the horse's shoe varies almost as much as his master's boot, and like it, when badly made, or unskilfully fitted, produces serious inconvenience, and even leads to accidents and diseases. When the feet are strong and properly managed, nothing is better than a plain shoe of tolerably uniform breadth and thickness, carefully fashioned to the shape of the foot. But many good authorities prefer what is called a seated shoe, which has a level part for the crust to rest upon, and within that the inner half of the shoe towards the sole surface is bevelled off. This seated shoe is thus wider than the plain shoe, and hence affords greater protection for a weak or flat sole. For faulty or diseased feet, special forms of shoes are suitable. In all healthy feet, the shoe should be fitted to the foot, and not, as is commonly done, the foot cut to fit the shoe. Another frequent error of keeping the shoe short and spare at the heels must be avoided. For roadsters, the toe of the fore-shoes should be slightly turned up, which greatly obviates tripping. The hind-shoes are generally thickened, and sometimes turned down at the heels. The number of nails required must vary somewhat with the weight of the shoe and soundness of the horn; five is the minimum, nine the maximum. It is important, however, that the shoes be firmly held on by as few nails as possible. In a saddle-horse with sound feet, three on the outside, and two on the inside, should suffice to hold a well-fitted shoe. Horses for heavy draught are generally shod in Scotland with tips and heels, which afford increased firmness of tread, and greater power, especially when dragging heavy loads. To preserve the foot in a sound state, the shoes should be removed every month. When the shoe is carefully taken off, the sole-surface on which it has rested should be rasped, to remove any ragged edges and any portions of adhering nails. Having for a month been protected from the wear to which the exposed portions of the foot are subjected, it will probably have grown considerably, and, in a stout hoof, will require to be cut down with the drawing-knife, especially towards the toe. Except in very strong feet, and in farm-horses working on soft land, the surface of the sole uncovered by the shoe seldom requires to be cut. It is the natural protection of the internal delicate parts, and must be preferable to the leather and pads often artificially substituted for it. The bars must likewise remain untouched, for they are of great service in supporting weight; whilst the tough, elastic frog must be scrupulously preserved from the destructive attacks of the knife, and allowed uninjured to fulfil its functions as an insensible pad, obviating concussion, and supporting weight. When the shoe is put on, and the nails well driven home, they should be broken off about an eighth or even sixteenth of an inch from the crust, and hammered well down into it. This obviously gives the shoe a much firmer hold than the usual practice of twisting off the projecting nail close to the crust, and afterwards rasping down any asperities that still remain. When the shoe is firmly clinched, the rasp may be very lightly run round the lower margin of the crust just where it meets the shoe, to smooth down any irregularities, but all further use of the rasp must be interdicted. The clinched nails, if touched, will only have their firm hold weakened; nor must the upper portions of the crust, which blacksmiths are so fond of turning out rasped and whitened, be thus senselessly deprived of those external unctuous structures, which render the unrasped foot so tough and sound, and so free from sandcracks. To prevent the hoof becoming too dry and hard, it is advisable, especially in roadsters, and in hot weather, to stop the feet several times a week with a mixture of equal weights of lard, tar, bees-wax, and honey, with about one-fourth part of glycerine, melted together, well stirred, and preserved in pots for use. Fuller details on this subject will be found in a little volume entitled *Notes on the Shoeing of Horses*, by Lieutenant-colonel Fitzwygram, 15th (the King's) Hussars; and in a paper on 'Horse-shoeing,' by Mr Miles, published in the *Journal of the Royal Agricultural Society of England*, and reprinted in a separate form by Mr Murray, Albemarle Street, London.

SHOES, SHOE-TRADE. Clothing for the feet, whether in the form of sandals or shoes, has been in use in every country aspiring to civilisation in

ancient and modern times. The rudimentary shoe is a sandal consisting of a sole, held to the foot by straps and thongs, as represented in fig. 1. Such were the common Egyptian and Greek shoes, to which the shoes of the peasantry of the Abruzzi, in

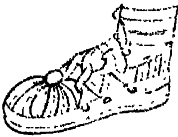


Fig. 1.

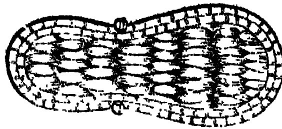


Fig. 2.

the south of Italy, bear a close resemblance. In Egypt, however, the ordinary materials for shoes were strips of the papyrus interwoven like a mat; an example of a sole of this kind is given in fig. 2. As is seen from paintings on the walls of Thebes, shoemaking formed a distinct trade in the reign of Thothmes III., 1495 B.C., or about the period of the flight of the Israelites. In the adjoining illustration, fig. 3, a sketch is presented from Thebes of two

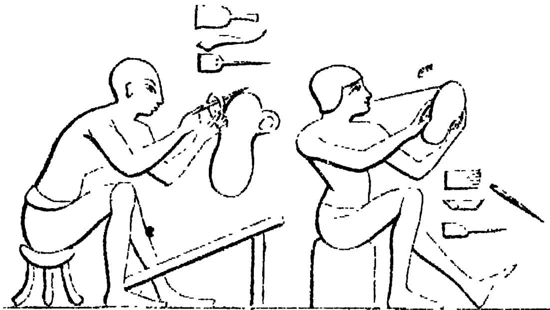


Fig. 3.

Egyptian shoemakers at work, with the tools of their profession beside them. The first workman is piercing with his awl the thong at the side of the sole, through which the latchets were passed; before him is a low sloping bench. The second workman is equally busy sewing a shoe, and tightening the thread with his teeth. It appears from one of the figures over the first workman that the bent awl of the modern shoemaker is of extreme antiquity. In one of the Greek dramas, allusion is made to the daily earnings of the shoemaker; and we know from historical record that the streets of Rome were encumbered with the stalls of shoemakers in the reign of Domitian. The shoe of the ancient Hebrews was a species of sandal. For ladies, the sandal, translated 'shoe,' in the Scriptures, was highly ornamental: 'How beautiful are thy feet with shoes, O prince's daughter' (Cant. vii. 1). Ornamented slippers are still a luxury in the East. The foot-coverings of the Romans were various in character, from the simple sandal and slipper to the boot, which extended up the leg. When the shoe covered the whole foot, it was termed *calceus;* the calceus of a particular form and of great strength worn by the Roman soldier was known as *caliga.* From wearing these shoes, the common soldiers were designated *caligati.* The Emperor Caligula was so called from having worn *caligulæ,* or little boots, when he served as a youth in the ranks of the army. Usually, the caligæ of the soldiers were studded with hob-nails.

Reference is made in Scripture to different symbolical usages in connection with sandals or shoes. The delivery of a shoe was used as a testimony in transferring a possession: 'A man plucked off his shoe, and gave it to his neighbour: and this was a testimony in Israel' (Ruth iv. 7). In cases of this kind, the throwing of a shoe on a property was a symbol of a new proprietorship or occupancy: 'Over Edom will I cast my shoe' (Psalm lx. 8). From these ancient practices, in which the shoe was symbolical of contract, perhaps comes the curious old custom in the north of England and Scotland of throwing old shoes for good luck after a bride and bridegroom on departing for their new home. We learn from several passages in the New Testament that the untying of sandals, as involving considerable trouble, was assigned to servants; the unloosening of the thongs, translated 'latchets,' accordingly became a symbol of servitude: 'The latchet of whose shoes I am not worthy to unloose' (Luke iii. 16). The carrying of the shoes of another is spoken of as a similar mark of inferiority: 'Whose shoes I am not worthy to bear' (Matthew iii. 11).

St Crispin and his brother Crispinian have long been regarded as the patron saints of shoemakers. According to mediæval legend, these personages were natives of Rome, and having become converts to Christianity, travelled into France and Britain to propagate the faith, everywhere supporting themselves by making shoes, which they sold to the poor at a very low price—one part of the legend being that an angel supplied them with leather. It is said that they suffered martyrdom in England towards the end of the 3d century. The memory of St Crispin, of whom we chiefly hear, has, from time immemorial, been kept up by processions and other festivities in his honour on October 25, which is known as 'St Crispin's Day.' Under this saintly tutelage, shoemaking has attained to the distinctive appellation of the 'gentle craft;' and above most other mechanical professions, is noted for the number of individuals who have risen from it to eminence. See an amusing but scarce work, *Crispin Anecdotes.* The sedentary and solitary nature of the craft, as hitherto conducted, has possibly had some influence in



Fig. 4.

producing a degree of thoughtfulness, while the act of hammering his leather is calculated, as some imagine, to stimulate the mental energy of the operative. If there be any real virtue in the sitting attitude of the shoemaker, a corresponding

evil attends that method of carrying on his operations. In every profession, sitting at work in a close atmosphere is particularly injurious to health. Statistics assure us that out of 10,000 artisans who sit at their labour, 2577 fall sick, and 95 die, annually; whilst as regards an equal number of those who alternately sit and stand, only 1713 sicken, and 61 die. To remedy this crying evil, a member of the profession, Mr J. Sparkes Hall, London, has invented a simple and inexpensive work-bench, at which shoes may be made standing. Of this standing-bench, we offer a sketch in fig. 4. A few days' practice, we are told, renders the workman as expert with the standing-bench as if he were seated according to the old plan, and he can execute closing with less fatigue and considerably more cleanliness. The only kinds of work in which sitting is more convenient are rounding the soles, lasting, and fitting, for which a seat may be employed.

The fashion of shoes, as has occurred with other articles of dress, has undergone innumerable changes. At one time, shoes were pointed to an extravagant degree; and in last century, the high heels of ladies' shoes became a monstrosity. Shortly after the beginning of the present century, the most marked improvement was the making of shoes right and left; the substitution of latchets for buckles about the same period was also a step in advance. In our own day, the general disuse of the shoe proper, and the introduction of short ankle-boots, are the chief changes of fashion. A proposal for a more perfect adaptation of shoes and boots to the shape of the foot, is noticed under FOOT. The shoemaking trade, as at present conducted in Britain, is divided into two departments—the bespoke and the ready-made or sale business. The larger department hitherto has been that in which customers bespeak boots and shoes by having them made to measure; but it is generally giving way to the plan of buying articles ready-made. The cause of this is exceedingly obvious. The process of measuring is usually very imperfect, owing, among other reasons, to the want of lasts to suit every variety of feet, as well as the too general indifference to meet individual peculiarities. On this account, and even at the risk of purchasing an inferior class of goods, the public are becoming daily more disposed to encourage the ready-made trade. Accordingly, large quantities of boots and shoes in innumerable varieties are now made and supplied wholesale by manufacturers for the retail dealers. Northampton, Stafford, and Leicester are considerable seats of this manufacture in England; and from certain districts in France, there are increasing importations, chiefly of a cheap kind of ladies' shoes.

The plan of making boots and shoes by isolated workmen at their own homes, has been found quite incompatible with the modern necessities of trade. As in the case of the handloom weaver, the shoemaker of the old school has had to succumb to machinery. After an unsuccessful struggle to oppose the introduction of sewing-machines, these are now coming generally into use, and men are employed in large numbers together in what may be called shoe-factories. This manufacture has long been a staple trade of Massachusetts, in which state the quantity of boots and shoes fabricated annually is numbered by millions of pairs. Recently, a machine has been introduced into the American shoe-trade for fixing the soles to the uppers by means of pegs, the inventor being a person in Salem, Massachusetts. A pair of boots or shoes can be pegged in two minutes. These pegged goods are disposed of wholesale in boxes, and may be seen in retail stores all over the United States. As evidence of the important character of the shoe-trade in Massachusetts, it may be mentioned that a few years ago there were as many as fifteen members of the 'gentle craft' in the legislature of that state.

In the year ending December 31, 1863, the exports of boots and shoes from the United Kingdom were as follows: Wrought boots and shoes, 4,436,734 pairs; wrought of other sorts, 646,442 pairs—united value, £1,539,410. In the same year, the imports were: Boots, shoes, and goloshes of all kinds, 441,739 pairs; boot-fronts, 470,844. The import was free, no customs-duties being now charged on this class of articles.

SHO'LA, the white pith of the leguminous plant *Æschynomene aspera*, a native of the East Indies. With this substance, which is exceedingly light, the natives of India make a great variety of useful articles, especially hats, which being very light and cool, are in great request. Helmets made of shola are much used by the British troops in India.

SHOOTING, with intent to wound, is felony in the law of England, and punishable with penal servitude for life. The offence consists in shooting at another, or drawing a trigger, or in any other manner attempting to discharge loaded arms. It is not, however, an offence unless there was a possibility of injuring some person; the intent must not only exist, but the relative situation of the parties must be such that serious injury might have ensued. The extent of the actual wound is immaterial.

SHORE. See SEA-SHORE.

SHORE, in Ship-building, is a strong prop or stanchion placed under the bottom or against the side of a ship, to keep her steady on the slip or in dock. Shores are also used to support or prop up a building during alterations.

SHOREDITCH. See TOWER HAMLETS.

SHO'REHAM, NEW, a seaport, and parliamentary borough of Sussex, on the left bank and at the mouth of the Adur, six miles west of Brighton. The town arose when the harbour of Old Shoreham, now a mile inland, became silted up. Pop. *of the parish* (1851) 2590; (1861) 3351. This increase is attributed to the extension of the ship-building trade here, and partly to the recent discovery of oyster-beds on the south-west coast of the Channel. More than 80 smacks, each manned by five hands, are employed in this parish in the oyster-trade. The parliamentary borough, which includes the *Rape* (see SUSSEX) of Bramber, contains 32,622 inhabitants.

SHORTHAND, a very useful art, by means of which writing is made almost as expeditious as speaking. In ordinary longhand, many separate motions of the pen are required to form each single letter: thus *m* requires *seven* motions, *k* requires *six*, *h five*, *t four*, *l three*, &c. But as syllables include vowels as well as consonants, and often two, or even three, and sometimes four consonants occur before or after a vowel, the number of motions requisite to write syllables in longhand is very great. The monosyllabic words *long* and *short*, for instance, require respectively *fourteen* and *seventeen* motions of the pen; while such syllables as *stream*, *splints*, *strength*, &c., require from *twenty-one* to *twenty-six* motions. Abbreviated writing is thus a necessity in all cases where language has to be written from ordinary delivery. Some stenographers make use of the common alphabet, and merely contract words by the omission of letters.

They would, for instance, write the last sentence thus:

So. stenog. ma. n. of th. com. alph. & mo. contr. wo. by th. om. of let.

This is not properly *shorthand*; the latter term is limited to writing which is both abbreviated in spelling, and simplified in the forms of the alphabetic characters. Much attention has been paid to this art in Britain during the last 300 years, upwards of 200 systems having been published within that period. The older systems were chiefly founded on orthography, the ordinary spelling of words being represented simply by a set of more convenient symbols for letters. The highest brevity attainable in this way was, however, altogether insufficient for reporting; and consequently, arbitrary signs for words and phrases, and distinctions in the value of characters, dependent on their relative position on, above, or below the line of writing, were largely used. The more modern systems have all been to a greater or less extent *phonetic*, or representative of sounds instead of letters, the number of sounds into which syllables may be resolved, being considerably smaller than that of orthographic elements.

Of the two classes of elements, vowels and consonants, the latter are the more important for the recognition of words; and these are generally written without lifting the pen, vowels being supplied by dots and other interpolated symbols. In some systems, no attempt is made to discriminate one vowel from another, but only the places where vowels occur are indicated by a general sign; in others, the five vowel letters have distinctive symbols; and in others an accurate representation of the varieties of vowel sound is aimed at. The degree in which words are recognisable without vowels, may be judged of by the following specimen:

Chmbrzz nsclpd a dcshnr v nvrsl nlj fr th ppl n th bss v th ltst dshn v th jrmn cnvrsshnz lcscn.

An indication of *where* vowel sounds occur—without shewing *what* vowels—will be found to give increased and sufficient legibility to a reader who is acquainted with the language. Thus:

Ch-mb-rz-z -ns-cl-p-d- - a d-csh-n-r- -v -n-v-rs-l n-l-j f-r th- p-pl -n th- b-s-s -v th- l-t-st -d-sh-n -v th- j-rm-n c-nv-rs-sh-nz l-cs-c-n.

Chambers's Encyclopædia, a Dictionary of Universal Knowledge for the People, on the basis of the latest edition of the German Conversations Lexicon.

Shorthand alphabets consist of simple straight and curved lines, to which hooks, loops, or rings are added. These elements of writing are common to all systems, but the powers associated with the symbols are, of course, different in different systems. Much ingenuity has been shewn by various authors in developing the application of the simple radial and segmental lines of a circle, and the positions of a dot, for the representation of language; but, in many cases, while a wonderful amount of apparent brevity has been attained—as by writing on a staff of lines, each of which gives a different value to the same sign—the systems are all but impracticable, from the multitude of details with which the memory of the learner has to be burdened. The prevailing fault of such systems of shorthand is, that they are long in being short. Reporters must abbreviate even the simplest possible form of alphabetic writing, but the mastery of a shorthand alphabet for other than reporting purposes, is a very easy matter; and the acquisition will be found valuable, in enabling a writer to save four out of every five motions of the pen, in private memoranda, correspondence, &c.

A great impetus was given to the study of shorthand, about 25 years ago, by the publication of Mr Isaac Pitman's *Phonography*. The introduction of the penny postage, at the same period, vastly aided the diffusion of the system, and societies for phonographic correspondence were established in all parts of the kingdom. The Psalms, the New Testament, and many other works, were published in the phonographic alphabet, and magazines written in shorthand found a widely-diffused circle of supporters. This system of writing is elegant and expeditious to a practised hand, and a very great improvement on all preceding systems. The alphabet consists of the following characters:

p b		r
t d		l
ch j		m
k g		n
f v		ng
th dh		*Duplicate forms.*
s z		s z
sh zh		r

The distinction between *breath* and *voice* (or *mute* and *sonant*) consonants, as above shewn, is happily expressed by a thickening of the symbolic line for the latter elements. The characters in the second column are, however, anomalous, the first four, which are written 'thin,' representing voice consonants, and the fourth and fifth, written with the difference only of 'thick' and 'thin,' representing distinct formations, which differ from each other as *d* does from *g*, and both of which are voice consonants.

In this system vowels are denoted by the interpolated signs—

placed at the top, the middle, or the bottom of the consonant lines. The vowel marks are written *thick* for 'long,' and *thin* for 'short' sounds. The long and short vowels are not, however, phonetic pairs, differing only in quantity; and thus the vowel scheme is less accurate than that of the consonants. It is, besides, very complex to a beginner, from the employment of a special set of characters for vowels preceded by *w* and *y*, the latter elements not being included in the alphabet of consonants.

In 'Phonography,' as in almost all other systems of shorthand, vowels are added by separate liftings of the pen, while their insertion is indispensable to legibility, unless special modes of writing consonant combinations are adopted. The latter expedient is employed by Mr Pitman for such compounds as *pr, pl, spr, str, nl, mp*, &c., the characters for which make, practically, large additions to the alphabet. The use of a general vowel sign would evidently be of little advantage in this system, as it would, equally with the exact vowel marks, require the pen to be lifted for its insertion.

In a more recent system of phonetic shorthand, a

new principle of writing is adopted, by which, the positions of all sounded vowels are indicated in the writing of the *consonants*, thereby securing easy legibility, with brevity and simplicity, in the writing of a *known* language. This system, the invention of Mr Melville Bell, is based on the following principles:

I. A full-sized character represents a consonant with a vowel sound *before* it.

II. A half-sized character represents a consonant with a vowel sound *after* it.

III. A tick-sized, or very small character, represents a consonant *alone*, and neither preceded nor followed by a vowel.

In this way, all words are distinguished to the eye as monosyllables, dissyllables, trisyllables, &c., without any necessity for interpolated vowel points. The relative size of the letters *pt*, for example, forming the consonant outline of the words *pet*, *apt*, *pity*, *poet*, &c., shews the first pair of these words to be monosyllables, and the others to be dissyllables. Thus:

pet, . .	tick *p*, full *t*.	one syllable.
apt, . .	full *p*, tick *t*.	
pity, .	half *p*, half *t*.	two syllables.
poet, .	half *p*, full *t*.	
attack, .	full *t*, full *k*.	
active,	full *k*, tick *t*, full *v*.	
capital,	half *k*, half *p*, tick *t*, full *l*.	three syllables.
appetite,	full *p*, full *t*, full *t*.	

The importance of this mode of writing will be at once obvious in such words as contain the same consonants with various syllabication, as *sport*, *sprite*, *spirit*, *support*, *separate*, *aspirate*, &c.

To a learner this system offers a very brief and easily read stenography of his own language, so soon as he has learned the alphabet only. The system is of course susceptible of the ordinary methods of abbreviation for the fleet exigencies of the reporter, such as the use of letters for words, special positions for 'logograms,' &c. Exact vowel marks also are provided for insertion wherever they are considered necessary, as in the writing of foreign words, proper names, &c. The following is Mr Bell's alphabet, as published in the *Reporter's Manual:*

k g		p b	
sh zh-y		f v	
h r		wh w	
t d		s z	
ch j		m	
l		n	
th dh		ng	

In this arrangement, *all* breath consonants are written by thin lines, and all voice consonants by thick lines; and no additional characters are used for compound consonants. The essential principle of the system, by which the positions of vowels, or the absence of vowels, are indicated in the writing of the consonants, manifestly dispenses with the necessity for separate symbols for combinations.

The three different sizes of the alphabetic characters, which express the effect of vowels in this system, are employed with some specific value in all systems. In Mr Pitman's *Phonography*, for instance, 'half-sized' consonants are used to denote the addition of *t* or *d* to the consonant which is written; while the *vowel* symbols are in size precisely the same as the characters which, in Mr Bell's phonetic shorthand, represent 'tick-sized' consonants.

The vowel scheme of the latter system furnishes a separate sign for every difference of vowel quality, and the distinction of thick and thin symbols is limited to actual phonetic pairs of long and short sounds, such as are heard in the words *full* and *fool*, *yon* and *yawn*. But, except in monosyllables written in the first or simply alphabetic style, the distinctive vowel signs rarely require to be inserted.

As an illustration of the aspect of the writing in these two phonetic systems, the following sentences are written in the full alphabetic styles:

1. Be fit to live that you may be fit to die.

1. Pitman. / Bell.

2. He that cannot be silent knows not how to speak.

2. Pitman. / Bell.

3. Where words are scarce they are seldom spent in vain.

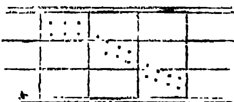
3. Pitman. / Bell.

4. Forgive and forget; do as you would be done by.

4. Pitman. / Bell.

The fundamental difference between these systems will be understood from the examples; in the first system, all syllabic sounds are definitely shewn by means of vowel points, but without these latter, a reader could not distinguish the number of syllables contained in a word; in the second system, the consonant outline, without inserted vowels, informs the eye of the number of syllables in every word—all full as well as all half-sized consonants being necessarily syllabic.

Some systems of shorthand consist mainly of ideographic signs, alphabetic writing being used only as supplementary to the arrangement of arbitrary symbols and ruled lines. Thus the positions *upon*, *above*, or *below* a single line, are associated with such meanings as *present*, *past*, and *future* for verbs; *affirmative*, *interrogative*, and *negative* for propositions; *personal*, *relative*, and *demonstrative* for pronouns, &c.; while the symbols for the various classes of words are merely uniform points, commas, hyphens, and other non-alphabetic marks. Sometimes the principle of different positional values of symbols is carried to so great an extent, that the projectors of such systems are able to boast, paradoxically, that one-half of any speech is virtually written before the speaker opens his lips! The difficulty of attending in rapid writing to such niceties of position as have been prescribed, may be conceived from the following specimen of 'dot' positions, extracted from Moat's *Shorthand Standard*:



Moat's system may be taken as the representative of this class. It is certainly the most elaborate and methodical—in fact, a marvel of ingenuity and perseverance—but, like other ideographic systems, it is so burdensome to the memory of a learner, as well as difficult in application, that it could never be of much use to any other person than the contriver.

In all systems, more or less use is made of what may be called analogical symbols, such as a *circle*, for the *earth*, the *world*, &c., with a point *above*, *below*, *before*, *after*, or *within* the circle, for such phrases as *above the earth*, *under the earth*, *in the world*, &c. But alphabetic writing by sound can derive little assistance from such arbitrary signs, however suggestive. Abbreviated phonetic writing undoubtedly furnishes the simplest and most exact method of stenography; and the two systems above exemplified, sufficiently illustrate the nature of the art of shorthand, as most widely practised on the phonetic basis at the present day.

The older methods of Byrom, Taylor, Gurney, Lewis, Odell, and other authors, still find many adherents. In fact, any system to which a writer is accustomed is better than longhand; and, practically, reporters and others modify for themselves, to a great extent, the systems they employ. Fancutt's *Stenography on the Basis of Grammar* (1840) may be referred to as a very ingenious work. Jones's *Phonography* (1865), a modification of Pitman's, is one of the most recent publications on the subject. A *History of Shorthand*, containing a chronological enumeration of authors, was published a few years ago.

SHORT-SIGHT. See SIGHT, DEFECTS OF.

SHOT is the term applied to all solid balls fired from any sort of firearms; those for cannon and carronades being of iron, those for small-arms, of lead. The latter are known as bullets and small-shot. The shot used for guns at present vary from the 3-pounder, for boat and mountain artillery, to the 10½-inch shot, which weighs about 150 lbs. as a sphere, or 300 lbs. as an elongated bolt. Generally, shot are cast. There are simple practical rules for calculating the weight from the diameter of a shot, and *vice versâ*, which are often useful in reading of artillery actions. Given the diameter in inches, to find the weight in pounds: Cube the diameter, and multiply the result by 14; reject the two right-hand figures; those remaining give the weight in pounds.—Given the weight in pounds, to find the diameter in inches: Multiply the cube-root of the weight by 1·923, and the result is the diameter of the shot in inches.

Small-shot is of various sizes, from swan-shot, nearly as large as peas, to dust-shot. It is made by dropping molten lead through a colander in rapid motion from a considerable height into water. The lead falls in small globular drops. The holes in the colanders vary in size according to the denomination of the shot, No. 0 requiring holes $\frac{1}{10}$th inch in diameter, No. 9, $\frac{1}{100}$th inch. The colanders are iron hemispheres, 10 inches in diameter, and are coated within with the *cream* or scum which is taken off the molten metal. A small portion of arsenic is melted with the lead, and the fusion in the colanders is maintained by those vessels being surrounded by burning charcoal. The discovery of the advantage attending a long fall was made in England towards the end of last century. Previously the shot had dropped from the colanders at once into the water. The lead was then so soft that the shot were flattened by the water. The fall through the air enables the lead to cool and harden before taking its plunge. The smaller sizes require less fall than the larger—100 feet suffices for sizes Nos. 4 to 9—the larger sorts demand 150 feet. The highest shot tower is at Villach in Carinthia, where there is a fall of 249 feet. After cooling, shot is sifted in successive sieves to separate the sizes. Misshapen shot are found by their inability to roll: and finally, the whole are polished by rotary motion in small octagonal boxes, in which a little plumbago has been thrown. See also CASE-SHOT, CANISTER, GRAPE-SHOT.

SHOTTS, a small and ancient village of Lanarkshire, close to the Kirk of Shotts, about 16 miles east of Glasgow. About 3 miles to the south-east of the Kirk, modern S., or S. Proper, began to rise at the close of the last century, when the Shotts Iron Company erected their extensive iron works there. S. may be said to consist of three villages—viz., Stane, Shotts Iron Works, and Dykehead; and the district within a radius of a mile from the works—which district includes these three villages—contains about 5000 inhabitants. Valuable coal and iron-stone, peculiarly suited for the manufacture of iron, abound in the district, and 1000 hands are employed in iron-making and moulding. At present (December 1865), there is no railway communication from and to S. for passengers; but after the Clelland and Midcalder branch of the Caledonian Railway is opened, S. will be the half-way station between Edinburgh and Glasgow on that line.

SHOULDER-JOINT, THE, is a ball-and-socket joint. The bones entering into its composition are the humerus or arm-bone, and the scapula or shoulder-blade, the large globular head of the former being received into the shallow glenoid cavity of the latter, an arrangement by which extreme freedom of motion is obtained, while the apparent insecurity of the joint is guarded against by the strong ligaments and tendons which surround it, and above by

the arched vault formed by the under surface of the acromion and coracoid processes. See SCAPULA. As in movable joints generally, the articular surfaces are covered with cartilage, and there is a synovial membrane which lines the interior of the joint. The most important connecting medium between the two bones is the capsular ligament, which is a fibrinous expansion embracing the margin of the glenoid cavity above, while it is prolonged upon the tuberosities of the humerus below. From its relations with the surrounding muscles, the ligament

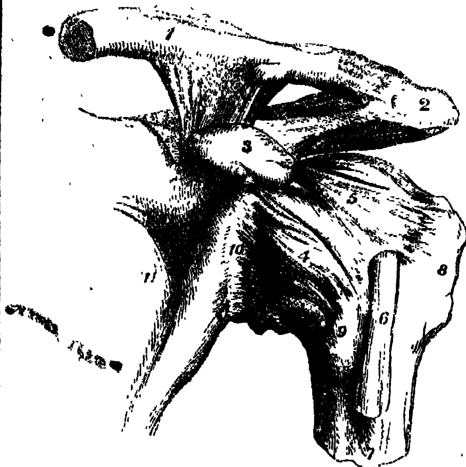


Fig. 1.—The left Shoulder-Joint and its Connections.
1, the clavicle or collar bone; 2, the acromion process; 3, the coracoid process; 4, the capsular ligament; 5, the coraco-humeral ligament; 6, the tendons of the biceps muscle; 7, the shaft of the humerus or arm-bone; 8 the greater tuberosity of the humerus; 9, the lesser tuberosity; 10, the neck of the scapula; 11, anterior surface of the scapula.

derives much of its strength. Accordingly, in paralysis of the arm, one or two fingers can often be pressed into the joint towards the head of the glenoid cavity, from which the head of the humerus is now separated.

The shoulder-joint exhibits the following varieties of motion: 1. Flexion, to a great extent; 2. Extension, in a much more limited degree; 3. Adduction, in an oblique direction, forwards and inwards; 4. Abduction very freely; 5. Circumduction; and 6. Rotation slightly.

The morbid affections of the shoulder-joint may be divided into (1) those arising from disease, and (2) those dependent on an accident. The most common diseases are acute and chronic inflammation of the joint, which often terminate in its anchylosis or immobility. The principal accidents are fractures and dislocations. There may be fracture (1) of the acromion process, or (2) of the coracoid process, or (3) of the neck of the scapula, or (4) of the superior extremity of the humerus; or two or more of these accidents may be associated. Again, the head of the humerus may be dislocated from the glenoid cavity as the result of accident in three different directions—viz. (1), Downwards and inwards into the axilla, which is by far the most common form; (2) Forwards and inwards; and (3) Backwards on the infra-spinous fossa, or the dorsum of the scapula. The first of these varieties is of such common occurrence, that persons of ordinary intelligence should know how to recognise, and even (in an emergency) to treat it. The bones are in the position shewn in the figure; and the following are the most prominent symptoms: 'The arm is lengthened; a hollow may be felt under the acromion, where the head of the bone ought to be; the shoulder seems flattened; the elbow sticks out from the side, and cannot be made

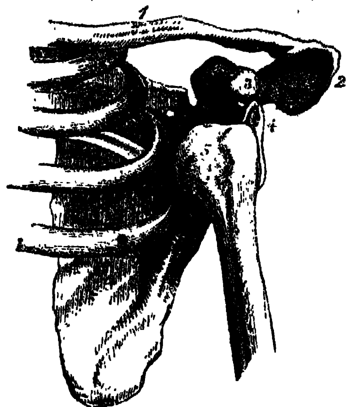
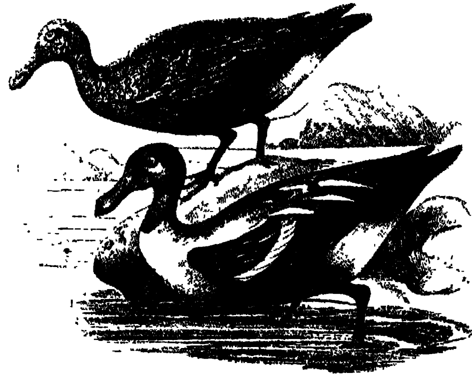


Fig. 2.—Dislocation of the Shoulder-Joint downwards.
1, the clavicle; 2, the acromion process; 3, the coracoid process; 4, the glenoid cavity; 5, the head of the humerus lying in the axilla.

to touch the ribs; and the head of the bone can be felt if the limb be raised, although such an attempt causes great pain and weakness, from the pressure exerted on the axillary plexus of nerves.'—Druitt's *Surgeon's Vade-mecum*, 8th ed. p. 282. There are at least five methods of treating this form of dislocation. It is sufficient to notice two of them. 1. Reduction by the heel in the axilla. The patient lies on a couch, and the operator sits at the edge, and puts his heel (the shoe or boot being previously removed) into the axilla, to press the head of the bone upwards and outwards, and at the same time pulls the limb downward by means of a towel fastened above the elbow. There is a figure of this operation in the article DISLOCATIONS. 2. Reduction by the knee in the axilla. The patient being seated in a chair, the surgeon places one of his knees in the axilla, resting his foot on the chair. He then puts one hand on the shoulder, to fix the scapula, and with the other depresses the elbow over his knee.—For a description of the symptoms and mode of treatment of the other forms of dislocation, and of the different varieties of practice, we must refer the reader to any systematic treatise on Surgery.

SHO'VELLER (*Rhynchaspis*), a genus of ducks



Shoveller, male and female (*Rhynchaspis clypeata*).

of the section having no lobe or pendent membrane on the hind toe, and remarkable for the expansion

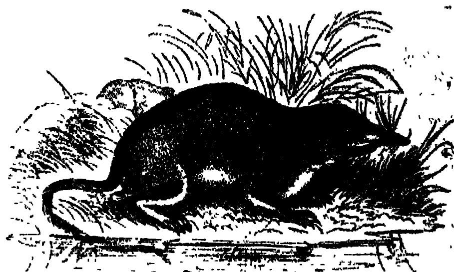
of the end of the mandibles in adult birds, particularly of the upper mandible. The lamellæ of the mandibles are long and very delicate. The legs are placed near the centre of the body, so that these birds walk much more easily than many of the ducks. The Common S. (*R. clypeata*) is smaller than the wild duck, but rather larger than the widgeon. The S. is a winter visitant of Britain, but not very common. A few remain all the year. It is widely distributed over Europe, Asia, and North America. Its flesh is very highly esteemed. A species of S. is found in Australia.

SHOWERS OF FISHES have occasionally fallen in different parts of the world, exciting great astonishment. Instances of this kind have occurred in Britain. A few years since, a shower of small three-spined sticklebacks fell near Merthyr-Tydvil in Wales, sprinkling the ground and house-tops over an area of at least several square miles. They were alive when they fell; yet if caught up by a whirlwind from any of the brackish ponds near the sea, in which this species of fish abounds, they must have been conveyed through the air a distance of almost thirty miles. Another recent instance occurred at Torrens, in the isle of Mull, in which herrings were found strewed on a hill five hundred yards from the sea, and one hundred feet above it.

Showers of fishes occur much more frequently in those tropical countries where violent storms, sudden gusts of wind, and whirlwinds are most common. In India, a shower of fishes varying from a pound and a half to three pounds in weight has been known to fall. Sometimes the fishes are living, more frequently they are dead, and sometimes dry or putrefying. They are always of kinds abundant in the sea or fresh waters of the neighbourhood; and it cannot be doubted that they are carried up into the air by violent winds or whirlwinds; although they sometimes fall at a considerable distance from any water which could supply them. The sudden reappearance of fresh-water fishes in ponds which have been dried up for months in tropical countries, is often popularly ascribed to their falling from the clouds; but the truth is, that they have been buried in the mud below, existing probably in a state analogous to that of animals in cold climates during hybernation. A pool, the bottom of which has long been dry, and on which grass has grown and cattle have walked, is again filled with fishes in a few hours after it is filled with water.

SHRAPNELL SHELL. See SHELL.

SHREW (*Sorex*), a genus of small quadrupeds of the family *Soricidæ*. They are often popularly confounded with mice and rats, but are really very different, having insectivorous and not rodent teeth. The head is very long; the snout elongated, attenuated, and capable of being moved about; the eyes small; the tail long; both body and tail covered with fine short hair; the feet have a broad sole and 5 toes. The genus has recently been subdivided, and the British species belong to more than one of the subdivisions. The COMMON S. of Britain (*S.* or *Corsira vulgaris*) was, until recently, confounded with *S. araneus*, a species common in continental Europe. It is nearly 2½ inches in length from the snout to the root of the tail, the length of which is about 1¾ inches. It abounds in dry fields, gardens, and hedge-banks; feeding chiefly on insects and worms, for which it grubs with its long snout amongst the roots of the herbage. It burrows, and makes long *runs* just under the surface of the ground. It is an excessively pugnacious little animal, and the males have fierce combats in spring, in which many are killed. Cats kill the S., but do not often eat it, probably on account of its strong musky smell; but it is the prey of weasels, hawks, owls, and shrikes. Harmless and inoffensive as it is, it has long been very generally regarded with



Common Shrew (*Sorex vulgaris*).

dread and aversion by the vulgar. (See White's *Natural History of Selborne*).—The WATER S. (*S. fodiens* or *Crossopus fodiens*) is larger than the Common S., being fully 3 inches long, and the tail 2 inches. It is of a blackish-brown colour, gray or white on the underparts. It burrows in the banks of streams, and is very aquatic in its habits. It is found in many parts of Britain.—Some of the Indian species of S. attain a much larger size, as that called the Musk Rat (q. v.). There is an Italian species which is the smallest of all known Mammalia. It is only about 1½ inch in length, exclusive of the tail, which measures about 1 inch.

SHREW MOLE (*Scalops*), a genus of insectivorous Mammalia, of the family *Talpidæ*, and very nearly allied to the moles. There are 6 incisors, 2 canine teeth, 8 false molars, and 6 true molars in each jaw. The ear is destitute of auricle; the eyes are very small, and much concealed; the feet are 5-toed, the fore-feet large, as in the mole. The whole figure, and also the habits, resemble those of the mole.—There are several species, all natives of North America.

SHREWSBURY, a parliamentary and municipal borough and market-town, the capital of Shropshire, stands on the Severn, by which it is nearly surrounded, 163 miles north-north-west of London by the London and North-western Railway. It is irregular in plan, contains many inferior houses, partly built of timber, but often of very picturesque appearance. In the modern quarters, the houses are handsome and regular. Two bridges, the 'English' and the 'Welsh,' cross the Severn, and connect the town with the suburbs of Abbey-Foregate and Coleham on the east, and Frankwell on the west. To the north, is the other suburb of Castle-Foregate. The town contains interesting remains of the ancient walls, the castle, two monasteries, and a Benedictine abbey. The remains of the Abbey Church now form the church of Holy Cross. There are other ecclesiastical edifices, a Free School, with an income from endowment of £3100 a year, and 22 exhibitions to the universities; a number of other important schools, institutes, hospitals, &c. The Town and County Hall, the Public Rooms, a handsome Greek structure, and the Market-house, dating from the reign of Elizabeth, are worthy of mention. S. carries on manufactures of linen-thread, canvas, and ironwares, and there is a salmon-fishery on the Severn. The Brawn and 'Shrewsbury Cakes' made here have long been held in esteem. The borough returns two members to the House of Commons. Pop. (1861) 25,803.

S., called by the Welsh Pengwern, was named by the Anglo-Saxons *Scrobbes-Byrig*, and of this the modern name is a corruption. The town connects itself intimately with the history of the country from the 12th to the 17th century. It was taken by Llewellyn the Great, Prince of North Wales, in 1215, during the disturbances between King John and the barons; and in 1403, Henry IV. here defeated the insurgent Percies and their allies with great slaughter. It was taken by the Parliamentarians in 1644.

SHRIKE, or BUTCHER-BIRD (*Lanius*), a genus of birds of the family *Laniadæ* (q. v.), approaching more nearly in character to the *Falconidæ* than any other of that family; having a short, thick, and compressed bill, the upper mandible curved, hooked at the tip, and furnished with a prominent tooth, the base of the bill beset with hairs, which point forwards. The species are numerous, most of them natives of warm climates, although some occur in the more northern parts of the world. They prey



Great Gray Shrike (*Lanius excubitor*).

on insects and small birds, and have a remarkable habit of impaling their prey on thorns; so that the nest of a S. may be discovered by the numerous insects impaled in the neighbourhood of it. Shrikes kill and impale many insects which they never eat, leaving them to dry in the sun; and in confinement they make use for this purpose of a nail. if provided with it, or stick portions of their food between the wires of the cage. They can imitate in some degree the notes of many birds, particularly those which are the utterance of distress, and they seem to make use of this power in order to attract birds within their reach. The most common British species, rarely seen, however, except in the south of England, is the RED-BACKED S. (*L. collurio*), a bird only about 7½ inches in length, about a third of the length being formed by the tail, which is square at the end. Insects are the chief food of this bird, but it also preys on small birds, young frogs, and even young pheasants.—The GREAT GRAY S., or SENTINEL S. (*L. excubitor*), is about the size of a thrush. It is a rare bird in Britain, but common in some parts of Europe, and is found also in Asia and North America. It was formerly used by falconers in catching hawks, of which it is greatly afraid, screaming loudly on their approach: the falconer waited in concealment, after fastening some pigeons and a S. to the ground, until the scream of the S. gave him notice to pull the string of his net.

SHRIMP (*Crangon*), a genus of crustaceans, of the order *Decapoda*, suborder *Macroura*, and family *Crangonidæ*, allied to lobsters, crayfish, and prawns. The form is elongated, tapering, and arched as if hunch-backed. The claws are not large, the fixed finger merely a small tooth, the movable finger hook-shaped. The beak is very short, affording a ready distinction from prawns. The whole structure is very delicate, almost translucent; and the colours are such that the creature may readily escape observation, whether resting on a sandy bottom, or swimming through the water. The quick darting movements of shrimps, like short leaps, however, betray them to any one who looks attentively into a pool left by the retiring tide on a sandy shore. When alarmed, they bury themselves in the sand, by a peculiar movement of their fanlike tail fin.—The COMMON S. (*C. vulgaris*) is very abundant on the British coasts, and very generally elsewhere on those of Europe, wherever the shore is sandy. It is about two inches long, of a greenish-gray colour, dotted with brown. It is in great esteem as an article of food, and is generally taken by nets in the form of a wide-mouthed bag, stretched by means of a short cross-beam at the end of a pole, and pushed along by the shrimper wading to the knees. Sometimes a net of larger size is dragged along by two boats. The supply of the market with shrimps affords employment to a great number of people.—The other species of S. seem to be equally fit for the table. Several are occasionally taken on the British coasts, but belong rather to more southern climates. Shrimps are very interesting inmates of the aquarium.

SHRO'PSHIRE, or SA'LOP, a frontier county in the west of England, bounded on the W. by North Wales, and on the E. by the counties of Stafford and Worcester. Area, 826,055 acres; pop. (1861) 240,959. The Severn, the principal river, enters the county from Montgomeryshire, about 12 miles west of Shrewsbury. It pursues a generally south-east course of 70 miles across the county, is navigable throughout, and is joined by two considerable tributaries, the Tern and Teme. To the north and north-east of the Severn, the county is generally level, and is under tillage; to the south and south-east, it is hilly and mountainous, and here cattle-breeding is extensively carried on. A breed of horned sheep is peculiar to this county. More than three-fourths of the whole acreage are arable, or in pasture and meadow. The soil is generally fertile and well cultivated, though there are still extensive tracts of waste land. S. is remarkable for its mineral wealth. The coal, iron, copper, and lead fields of Coalbrookdale, Snedshill, Ketly, &c., are very productive. Several thousand persons are employed in raising coal, iron, stone, and lime, and in the iron manufacture. The county returns four members to the House of Commons. Capital, Shrewsbury.

SHROUDS are very strong ropes passing from the heads of the lower masts in a ship to the chains or channels on her sides, for the purpose of affording lateral support. They are crossed by thinner ropes, called ratlines, to form steps or ladders. The top-mast shrouds in ship-rigged vessels are similar, except that they terminate in a row of dead-eyes on the outside of the tops.

SHRO'VETIDE (Anglo-Saxon *scrifan*, to shrive, to confess) literally means 'confession-time,' and is the name given to the days immediately preceding Ash-Wednesday, which, as indeed the whole period after Septuagesima Sunday appears to have been, were anciently days of preparation for the penitential time of Lent; the chief part of which preparation consisted in receiving the sacrament of penance, i. e., in 'being shriven,' or confessing. In the modern discipline of the Roman Catholic Church a trace of this is still preserved, as, in many countries, the time of the confession, which precedes the

paschal or Easter communion, commences from Shrovetide. These days were sometimes called Fasting-tide or Fast-mass, names which are still retained among the population in some parts of Great Britain. The name of S. was retained in England after the Reformation, although the practice of 'shriving,' in which it had its origin, was abandoned. The precept of 'shriving' having been fulfilled, the faithful, upon the eve of entering upon the Lent, were indulged with permission to give themselves up to amusements, and to festive celebrations, of which the counterpart is still seen in the continental carnival. In England, the pastimes of football, cock-fighting, bull-baiting, &c., were, down to a late period, recognised usages of S.; and the festive banquets of the day are still represented by the pancakes and fritters from which Pancake Tuesday took its name, and by the 'collops' which gave its title to Collop Monday. These usages are gradually disappearing.

SHRUB (see SYRUP), a kind of liqueur made chiefly in the West Indies. It consists of lime or lemon-juice and syrup, to which a small portion of rum is added; other flavouring materials are used occasionally.

SHRUBS are plants with woody stem and branches like trees, but of smaller size, not generally exceeding 20 feet in height, and branching near the root, so as to have no main stem of considerable height. When a shrub is of small size and much branched, it is often called a *bush*. There is no more important botanical distinction between trees and shrubs, and the same genus very often includes species of both kinds. Many shrubs, as honeysuckle, are climbers.

In point of law, whoever plants a shrub thereby makes it part of the soil, and it becomes a kind of fixture, incapable of being removed by tenants. But if the tenant is a nurseryman, who makes a business of planting and removing shrubs, it is otherwise. Whoever unlawfully and maliciously cuts, breaks, barks, or roots up a shrub growing in a pleasure-ground, garden, or ground adjoining a dwelling-house, if the injury exceed one pound in value, is guilty of felony, and liable to penal servitude for three years; and wherever the shrub is situated, if the damage amount to one shilling, the person is liable to be imprisoned or fined by a justice of the peace.

SHUGSHUT, a small town of Turkey in Asia, in Anatolia, on the left bank of the Sakaria, 95 miles in direct line south-east of Constantinople. On an adjacent hill is the tomb of Othman (q. v.), founder of the Ottoman dynasty. The tomb, resembling the handsomest and most ancient of the Turkish sepulchres at Constantinople, stands amid a grove of cypresses and evergreen oaks. Pop. estimated at about 5000.

SHUMALA'RI. See HIMÂLAYA.

SHU'MLA, a strongly fortified city of Bulgaria, European Turkey, stands on the Little Balkan, 50 miles west of Varna, and 60 miles south-south-west of Silistria. It is bounded on the north and west by mountains, and on the south and east by an undulating plain furrowed by valleys that extend north to the Danube. Its situation is pleasing, and the character and distribution of its buildings give it a picturesque appearance. The roads from the Turkish fortresses on the Lower Danube and in the Dobrudscha on the north, and from the passes of the Eastern Balkan on the south, converge upon S., and for this reason it is an important strategic position. It contains an arsenal, military hospital, large barracks, a citadel occupying a height, and surrounded with high and thick walls; and in 1853, on the outbreak of the war with Russia, its fortifications were greatly extended. In the vicinity is an intrenched camp in a position of great natural strength, which can accommodate from 40,000 to 60,000 men. The more accessible approaches to the town are guarded by forts. The culture of wine and grain, and the rearing of silk-worms, are the chief employments; and the town is famous for its manufactures of copper and tin wares, ready-made clothes, and leather. Pop. 30,000, exclusive of the garrison. The Russians attacked the town in vain on three separate occasions—in 1774, in 1810, and in 1828.

SHUNT SYSTEM OF RIFLING is a very ingenious arrangement for securing the accurate centring of a projectile discharged from a rifled cannon. To obtain precision of aim and range, it is absolutely essential that the axis of a projectile should, at the moment of discharge, coincide exactly with the axis of the bore. This can scarcely be obtained unless the shot fits with extreme tightness into the gun; and if it does so, and the gun is a muzzle-loader, it is scarcely possible to load it. The ordinary principle has the projectile smaller than the bore, so as to pass readily into the gun, resting, of course, on the bottom of the bore. The projectile is covered with a soft metal, as lead, which expands with the pressure behind, and fits the shot tight into the grooves; but from the fact that it rests (at the commencement of the expansion) on the bottom of the bore, the axis of the shot is always below the axis of the bore. To obviate this, Sir William Armstrong designed the 'shunt' system, which in practice has been found admirably effective. In rifling the gun, the groove for 14 inches from the muzzle consists of a wide, deep indentation (*b* in figs. 1 and 2), and at the side of it a narrow indentation of less depth, *a*; from 14 inches to 22 inches from the muzzle, this narrow groove gradually deepens, till it attains the level of the broad groove, after which they run together for a short distance, until a shunt at *c*, fig. 2, narrows

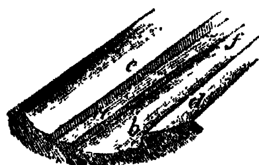


Fig. 1.

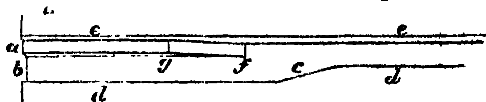


Fig. 2.

the whole groove on the same side as *a* to the original width of *b*. Projecting from the shell (fig. 3) is an iron flange *a*, too high to pass the narrow groove, and still higher, by its side, a narrow band of zinc or of brass studs, *b*. Each of these passes freely along the broad deep groove of the bore. As the shot is rammed home, the twist of the rifling brings the iron flange against the edge *d* (figs. 1 and 2) of the broad deep groove, which enables both the flange and zinc band to pass freely until past *f* (fig. 2), where the inclined plane ends. At *c*, however, where the groove becomes narrowed to only the width of the flange and band together, the shot is shunted over to the left. In this position it is rammed home. In coming out, of course, the

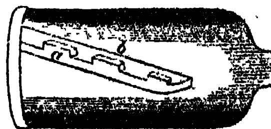


Fig. 3.

pressure of the twist is reversed, and the zinc band presses against the straight edge *e*; on reaching *f*, the force of the exploded powder behind drives the shot on, while the inclined groove from *f* to *g* flattens down the zinc band, so that the projectile ceases to lie on the bottom of the bore, and is firmly centred by its several bands on the shallow grooves (whatever their number may be) round the bore's circumference. The lead fitting at the back of the shot has been meanwhile driven by the explosion into the deep wide grooves, so as to stop windage.

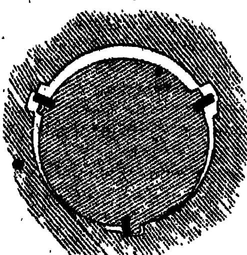


Fig. 4.—Going in.

The Russians have a shunt system borrowed from Sir W. Armstrong's, but differing in details. American guns, on similar principles, have been made experimentally. The invention does not appear to have been yet applied to small-arms.

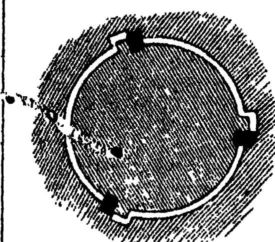


Fig. 5.—Coming out.

The sections of the muzzle in this article, figs. 4 and 5, are necessarily exaggerated in regard to the position of the shot, to shew the principle. In reality, there is only a minute difference between the diameters of bore and projectile.

SHU'SHA, a fortified town of Russian Transcaucasia, in the government of Shemakha, and 120 miles south-west of the town of that name. It occupies a strong position on a mountain, accessible only on one side, and is said to contain upwards of 15,000 inhabitants.

SHU'STER, a city of Persia, in Khuzistan, on the Karun, 30 miles east-south-east of Dizful, at the foot of a range of sandstone hills. In the early part of the present century, it was an important town and the capital of the province; but it was nearly depopulated by an epidemic in 1832, and was much damaged by an inundation in 1840. On a height stands the castle, commanded, however, by a loftier elevation. The walls have been allowed to fall, and a fourth part of the town is in ruins. Customs are collected here, but the trade is not extensive. Pop. about 10,000.

SHUTTLE, the instrument used to carry the weft-thread in weaving. See LOOM.

SIA'LOGOGUES are substances which, by local stimulating action, increase the secretion of Saliva (q. v.). Amongst the substances which thus act as direct stimulants to the salivary glands, we may especially mention Horse-radish root, Mezereon bark, and Pellitory root. Horse-radish root when chewed, produces a copious flow of saliva, and has been found useful in aiding deglutition in cases of paralysis of the tongue. If Mezereon bark is used in the same way, the saliva should be frequently ejected, in consequence of the acrid properties which it absorbs from the drug. Pellitory root is the best of this class of remedies. Fragments weighing from half a drachm to a drachm may be frequently chewed when we wish to increase the flow of saliva in cases of facial neuralgia, rheumatism of the muscles of mastication, and paralysis of the tongue.

SIA'M (native name *Thâi* = the Free, or *Muang Thâi* = the Kingdom of the Free), the chief state of Indo-China, is bounded on the S. by the Gulf of Siam and the Malay Peninsula. On the W., N., and E., the frontier-line is ill-defined and fluctuating, owing to many tribes being only partially under subjection, and to the constant wars of aggrandisement between S. and the Malayan and Burmese races on the west, and the Cambodian and Cochin-Chinese races on the east. According to a recent account, the country lies in lat. 4°—21° N., long. 96°—102° E.; is 1200 miles in length, and about 350 miles in extreme breadth. Area estimated at from 190,000 to 290,000 sq. m.; pop. stated at from 4,500,000 to 5,000,000. The kingdom consists of 41 provinces, each governed by a Phaja, or functionary of the highest rank. There are numerous districts beyond the limits of the kingdom proper, as the Laos, Malayan, and Cambodian dependencies, which are more or less under subjection to S., and pay tribute generally once in three years. S. itself pays tribute to China, but only as a matter of usage and convenience, for it receives from that country more than a return, in the remission of duties upon Siamese vessels bound to Chinese ports. Cambodia is situated between S. on the west and Cochin-China, and as sovereignty over it is claimed by both these countries, and as it is too feeble to resist the claims, it pays tribute to both.

Surface, Hydrography, Coast-line, Soil, and Climate.—The mountains which cover the northern districts of the country, and form natural barriers along its east and west frontiers, are branches of the great system of the Himalaya. Though the northern dependencies of S. are mountainous, the kingdom proper is a vast plain, which only becomes hilly on its northern frontier. The great river of the country, the Nile of S., is called by foreigners Menam, or more commonly, Meinam; but the Siamese call all rivers by this name, and distinguish the river by adding to the name Menam the name of the chief town or village on its banks; thus, Menam Bangkok is the river of Bangkok, that is, the great river of the country, which Europeans and other foreigners have agreed to call Meinam. This river, the great life-sustaining artery of the country, rises among the mountains of the Chinese province of Yunnan, whence it flows south, and after a course of more than 800 miles in this direction, throws itself by three mouths, which are from 6 to 8 fathoms deep, into the Gulf of Siam, about 30 miles (18 miles in direct line) below Bangkok. It receives a number of important affluents, notably the river Phitsalok, which joins it in lat. about 17° 35' N. The annual inundation of the Meinam, the occasional non-occurrence of which entails failure on a great portion of the rice-crops, commences in June, and ends in November. Impregnated with the rich soil which it brings from the interior, its waters, in August, overflow the banks to a height sometimes exceeding six feet above the ordinary level. The tract of country within the direct influence of the inundations is estimated at 12,000 sq. m.; but, properly speaking, the actual valley of the Meinam, commencing 450 miles above the mouth of that river, and with an average breadth of 50 miles, has an area of upwards of 22,000 sq. m., and forms a tract of country the fertility of which is not exceeded in any other quarter of the globe. Of the other great rivers, the chief is the Mei-kong, which flows through the eastern districts of the empire, and is said to be 1600 miles long. The coast-line, fringing the edge of the Gulf of Siam, may be roughly estimated at 1100 miles, exclusive of minor windings.

The principal ports on the coast-line are Paknam (pop. 6500), defended by three forts; Paklat, a few miles above Paknam (pop. 7000), defended by a fort on each side of the river; Meklong, at the mouth of the river of the same name, long. 100° 10′ E., a beautiful city, with floating bazaars, fine pagodas and gardens, and a pop. of 10,000; Chantaburi, long. about 103° E., near the mouth of a river which, though short, fertilises with its inundations a considerable district, a place of active trade with China and Cochin-China, with a pop. of 6000; and Bangplasoi, 27 miles east-south-east of Paknam, engaged in a profitable fishery and in agriculture, pop. 6000. The breadth of the Malayan Peninsula, in lat. 11° N., is only 50 miles, and here two streams, the one flowing west to the Bay of Bengal, and the other east to the Gulf of Siam, offer great facilities for the construction of a ship-canal, for their sources being near each other, a few miles of canalisation are all that would be required to connect them, and thus form a sea-way across the peninsula, which would shorten the voyage between India and Eastern Asia by many days, and often by weeks.—The climate of S. is, for a tropical region, salubrious; the resident missionaries speak highly in its favour. The mean temperature at Bangkok, for a series of eight years, was 81° 14′; the maximum heat, within the same space, was 97°, and the minimum 54°. Hurricanes and typhoons are almost unknown in S., though it is visited every year by the south-west and north-east monsoons—the former bringing clouds, thunder-storms, and rain, the latter bringing refreshing weather.

Agriculture, Flora, and Fauna.—In S., few of the instruments in use in scientific agriculture are known, and in many parts of the country, in 1855, the ground was prepared for the seed by turning herds of buffaloes into the fields to trample down the weeds and move the soil, and afterwards by harrowing the ground with thorny shrubs. But the soil here is so rich that the smallest outlay of capital and labour is rewarded by abundant harvests. A much more advanced system of agriculture, however, has been introduced within recent years, and the quantity of agricultural products exported has greatly increased. Rice and sugar are the principal crops. Of the other products, the chief are *Aquila*, or eagle-wood, renowned for its perfume, and extensively used on that account at funerals, marriages, and other ceremonies in Eastern Asia; gutta-percha; cardamoms; gamboge; bamboo; the rattan; valuable palms; the guava; mango; daurien, esteemed the king of fruits in S.; the mangosteen, and many other fruit and other trees, including teak and a variety of valuable ship and house timbers. Among the animals, the most famous is the elephant, which abounds in the forests. It is against the law of S. to kill elephants, as these animals are considered the property of the king; but many of them are nevertheless slain for the sake of their tusks. A variety of this animal, said to be peculiar to S., is the white elephant, which is not really white, but of a light mahogany colour. This animal is held in the highest veneration, the cause of which is, that he is 'supposed to be the incarnation of some future Buddha, and will therefore bring blessings on the country which possesses so great a treasure.' He is fed upon fresh grass, and sugar-canes and plantains, served in rich dishes, is covered with ornaments, inhabits a building attached to the palace, enjoys the rank of nobility, and is tended by a staff of officers, guards, valets, &c. Tigers abound, especially in the Laos country in the north; tiger-cats, rhinoceroses, boars, wild pigs, elks, and deer of many kinds, tenant the woods. Crocodiles, lizards, and serpents of various kinds are numerous. Excellent fish are found on the coasts and in the rivers.

Minerals.—Gold is found among the mountains, and silver in combination with other metals; copper, tin, lead, and iron are abundant, and are extensively worked by the Chinese. Precious stones are found in great number and variety.

Manufactures.—Vases, urns, and other vessels, in the manufacture of which gold is embossed upon silver, are made here in great numbers, and have an oriental celebrity. Gold-beating, iron-founding, and manufactures of fine cloth, glass wares, and pottery are carried on.

Commerce, Exports and Imports.—In former times, Bangkok (q. v.) was the most commercial city east of the Cape of Good Hope, after Calcutta and Canton, and 60 British ships were engaged in trade with the river Meinam. But in 1855, such had been the influence of bad legislation, and such the destructive progress of monopoly, that the foreign trade had become reduced almost to nothing. Sir John Bowring, Her Majesty's Plenipotentiary, arriving in S., negotiated a treaty of friendship and commerce with the Siamese rulers (signed at Bangkok, April 1855), which provides that British subjects are permitted to trade freely in all the seaports of S., may purchase lands, houses, &c., and may profess the Christian religion undisturbed. By this treaty, all monopolies are rescinded, British traders purchasing directly from the producer, and selling directly to the purchaser, without the interference of any third party. Export duties are levied upon all goods that leave the country, but they pay one impost only, whether this be levied under the name of inland-tax, transit-duty, or duty on exportation. Prior to 1856, when the treaty first took effect, the British arrivals (including Mussulman vessels under the British flag) amounted to only 12 per annum; in 1858, they amounted to 81 vessels; and in 1863, the entries were 82 vessels, of 30,363 tons, and the clearances 78 vessels, of 28,603 tons. In 1863, 600 vessels of all nations (not including junks), of 255,657 tons, entered and cleared the port of Bangkok. In the same year, the exports amounted to £880,000, and the principal articles were rice, 1,632,000 piculs (the picul = 133⅓ lbs.); sugar, 82,700 piculs; and large quantities of stick-lac, hides, gum, pepper, horns, and the other products and manufactures of the country, including a small quantity of cotton. These statistics are for the port of Bangkok alone. No statement can be given of the revenue and expenditure; but judging from the quantity of duty-paying goods exported, it may be supposed that the former is satisfactory.

Inhabitants and Government.—The Siamese proper, that is, the Thâi race, form about a third of the entire population. 'They are gentle, timid, careless, and almost passionless.' They differ in several respects from many eastern nations. Lying, though frequently resorted to as a protection against injustice and oppression, is not a national characteristic. The Siamese are inclined to be idle, inconstant, and exacting; but they are sincere, very affectionate in their domestic relations, witty in conversation, and, like the Chinese, expert in mimicry. About a third of the whole population are Chinese, who are great emigrants, but who, wherever they go, preserve their own language, customs, costume, habits, and social organisation. There are, it is estimated, 1,500,000 Chinese in S.; in Bangkok alone there are 200,000. All the active business of the country is in their hands. The Laos people (see SHAN STATES) are also very numerous in the country, and there are considerable numbers of Malays and Cambodians. The religion of the Siamese is Buddhism (q. v.), which inculcates the

highest veneration for life in whatever form. A Siamese will not kill vermin or serpents; and the tameness of many creatures that in Europe flee from the presence of man, is observed by all strangers. The use of Betel (q. v.) is almost universal in Siam. All the *belles* of S. stain their teeth black. The Siamese are extremely ceremonious in their intercourse one with another. An inferior crouches and crawls on the ground before a dignitary, and speaks of himself as 'your slave—a hair—a little beast.' They are a small well-proportioned race, with olive-coloured skin, and black hair, of which all that they allow to grow is a tuft about two inches long on the top of the head—the rest being shaven off. They are remarkably fond of jewellery and ornaments, and the dresses of the higher functionaries and nobles is splendid and beautiful. They are fond of music; have a number of good native instruments, as well as the common European ones, and are skilful performers.

The government is an absolute and hereditary monarchy, and there are two kings. The First King is the actual monarch; the Second King, who receives about one-third of the revenue, and has an army of 2000 men, seems to occupy the place of first counsellor, and is invariably consulted by the First King before any decisive step in the administration of affairs is taken. Both the present monarchs can speak and write English, have been careful and appreciative students of the great English writers, understand the use of the sextant and chronometer, and are well versed and deeply interested in the mechanical arts. The kings are assisted in the administration by a cabinet and council.

History.—The annals of the Siamese begin about five centuries B.C. But nothing authentic is known of the history of the country till 1350, in which year Ayuthia, the former capital, was founded. Cambodia was first conquered in 1532, and in this century the Siamese dominion extended to Singapore. The present dynasty ascended the throne in 1782. There have been numbers of Protestant and Catholic missionaries in S. since the year 1828, but so far as the Siamese are concerned, their labours have been almost if not altogether fruitless.—For further information on this most interesting country and people, see Bowring's *Siam* (Lond. 1857).

SIAM, Gulf of, an important arm of the Chinese Sea, is bounded on the N. and W. by Siam, on the S.-W. by the Malay peninsula, and on the N.-E. by Cambodia. At its entrance between Cambodia Point and the peninsula of Patani on the Malay Peninsula, it is 235 miles wide, and from the line drawn between these two points it extends inland in a north-west direction to the mouth of the Meinam, a distance of 450 miles. Four great rivers, navigable to a considerable distance from their mouths, and the chief of which is the Meinam (see Siam), fall into the gulf. It is unvisited by hurricanes of any kind, and shipwrecks here are very rare.

SI'AMESE TWINS, a name given to two youths, Eng and Chang, born of Chinese parents in Siam, in 1811, having their bodies united by a band of flesh, stretching from the end of one breast-bone to the same place in the opposite twin. The survival to advanced life of such a *lusus naturæ* makes this one of the most remarkable cases on record. A union of the bodies of twins by various parts is not an unusual occurrence (see Monstrosity). Ambrose Paré has depicted instances of union by the back, belly, and forehead. The last occurred in two girls, who lived to the age of ten years, when one of them dying, a separation was made: the wound of the living girl assumed a bad character, and soon proved fatal. The Hungarian sisters, who lived about a century since, were united by the back, had one passage from the intestines, and each had one from the urinary organs. They died when they were 22 years of age. The Siamese twins were purchased of their mother at Maklong, a city of Siam (q. v.), and were brought to America by Captain Coffin and Mr Hunter in 1829. On examination, the connecting band seemed to have united them at first face to face, but constant traction had so changed its direction, that they stood partially side by side. Its length above was about two inches; below, nearly four; from above, downwards, it measured three inches; and its greatest thickness was one and a half inch. It is covered with skin, and when the centre is touched, both feel it; but on touching either side of the median line, only the nearest individual is sensible of it. The connection between the Siamese twins presents many interesting points in regard to physiology and pathology, for although they form two perfectly distinct beings, they appear most frequently to think, act, and move as one individual.

After realising a competence by the exhibition of themselves in the various countries of Europe, the Siamese twins settled in one of the southern states of America, where they were married to two sisters, and had offspring. Owing to domestic quarrels, however, two houses were found necessary, each living with his wife a week at a time alternately. Ruined by the late disastrous civil war in America, the Siamese twins are again, it is said (1866), to make the tour of Europe, and exhibit themselves to the public.

For a full account of the structural peculiarities of such cases, see St Hilaire's *Histoire des Anomalies de l'Organisation d'Homme et des Animaux.*

SIARA, properly, Ceara (q. v).

SIBBALD, Sir Robert, an eminent Scottish naturalist, born at Edinburgh, 15th April 1641, of a good family (the Sibbalds of Balgonie, in Fife), studied at the High School and university of Edinburgh, and afterwards pursued his medical studies at Leyden, Paris, and Angiers; settled as a physician in Edinburgh in 1662, devoted much time to botany and zoology, and aided Sir Andrew Balfour in establishing a botanic garden in Edinburgh. Having inherited an estate, he retired from medical practice, but continued his scientific pursuits; was appointed by Charles II. his Majesty's Geographer for Scotland, and was encouraged to prepare a work on the geography and natural history of his native country. His death is supposed to have taken place in 1722. He published many pamphlets on medical subjects, natural history, Scottish history, antiquities, &c. The work for which he is now chiefly remembered is his *Scotia Illustrata, sive Prodromus Historiæ Naturalis*, &c. (fol. Edin. 1684), a work of great merit for its time, but his *Collection of Several Treatises in Folio Concerning Scotland, as It was of Old, and also in Later Times* (Edin. 1739), is not without value.

SIBE'RIA, a vast territory in Northern Asia, belonging to Russia, and including all the Russian possessions in that continent, with the exception of the Transcaucasian and Armenian provinces, is bounded on the N. by the Arctic Ocean; on the E. by the seas of Kamtchatka, Okhotsk, and Japan, all of them arms of the Pacific Ocean; on the W. by the Ural Mountains, Ural River, and Caspian Sea. On the S., its boundary is constantly tending southwards, and according to the latest authorities, consists at present of a line running in lat. 45° N., between the Caspian and Aral Seas, crossing the latter to a point on the eastern shore in lat. 43° 40′ N., thence (enclosing the eastern seaboard of the

Aral Sea) north to the Sir-Daria, following that river to Otrar, then keeping along the Boroltai range in a south-east direction to a point in lat. 42° 25′ N., long. 72° 13′ E., thence along the Alexandrian range, forming the southern boundary of the Chui (a tributary of the Sir-Daria) basin, thence north-north-east to lat. 55° N., long. 96° E., south-east to Kiachta (q. v.), eastwards to the Argun River, which it follows to the Amur, and the latter to long. 135° E., when it trends in a south-south-west direction, ascending the Usuri tributary for 200 miles, and then running straight south-west to the sea in lat. 42° 30′ N., and long. 130° 30′ E. S. is divided for administrative purposes into the following 4 governments and 7 territories:

	Surface in Eng. sq. m.	Pop. (1858).
Governments—		
Tobolsk,	565 920	1,021,266
Tomsk,	329,783	694,651
Jenisei-k,	958,012	303,256
Irkutsk,	279,963	319,936
Territories—		
Transbaikal,	210,799	352,534
Yakutsk,	1,500,141	217,955
Amur,	107,514	40,000
Littoral (including Kamtchatka, Okhotsk, &c.),	708,253	26,438
Saemipalatinsk,	178,128	217,451
Kirghiz of Siberia,	304,812	277,451
Kirghiz of Orenburg,	363,766	600,000
Total,*	5,507,151	4,070,938

or about three inhabitants to every four English sq. miles. The northern and eastern shores are very irregular in form, jutting out frequently into bold peninsulas and promontories, and being indented with numerous immense inlets, chief of which are the estuaries of the Obi (575 miles in length) and of the Yenesei; the Gulf of Anadir, and the sea of Okhotsk. All the island groups to the north of S., and the Aleutian Isles, some of the Kurile Isles, and Sakhalin or Saghalien on the east coast, are considered to belong to Siberia. The Liakhoff group, near the mouth of the Lena, consists of three islands, from 60 to 100 miles long by 20 to 40 broad, and of numberless islets: they are completely barren, and present in their soil and subsoil alternate layers of sand and ice, in which are embedded the fossil remains of numerous animals. The greatest length of S. is 5600 miles from north-east to south-west, and the greatest breadth 2170 miles from north to south. A country of such vast extent (one-half larger than Europe) must necessarily exhibit great varieties of climate; and we accordingly find in the northern regions, much of which lie far within the Arctic Circle (Cape Sievero Vostochnii, the most northerly promontory of S., and of the Old World, being in lat. 78° 25′ N.), an extensive tract bordering on the ocean, composed of swamp, moorland, and mossy flats, covered with snow and ice for one half of the year, and even during the greatest heats of summer, released from its icy bonds only to the depth of a few inches below the surface of the soil. The ocean, its northern boundary, is frozen for miles seaward during more than half the year, and during the remaining months, the numberless icebergs and floes which crowd the sea, and continually come into collision, render the navigation so dangerous that no complete hydrographic survey of the coast has yet been made. On the southern boundary of this semi-barren zone, stunted misshapen bushes and trees are found; and as we advance southwards, vegetation appears in the form of extensive forests of birch, fir, and larch, which clothe the plains and hill-sides, and are interspersed with stretches of pasture of moderate quality. After crossing the parallel of lat. 64° N. in West S., and that of lat. 61° N. in East S., the more hardy cereals, barley, oats, and rye, begin to appear, and the soil increases in fertility, sometimes to an extraordinary extent, thick woods of Siberian cedar and other trees clothe the mountain sides, and the valleys, especially along the banks of rivers, are in a state of continuous cultivation. The fertility of great portion of the governments of Tobolsk and Tomsk, especially of the *Baraba* and *Ishim* steppes, is proverbial, and they are the great granaries of Russia and Northern Europe. The whole of Western S. is one great plain, sloping from its southern boundary, where the average elevation is 2000 feet, northwards to the Arctic Ocean; with the exception of the small corner in the south-west, which is drained into the Caspian and Aral Seas. Eastern S. is more hilly and less fertile than the western portion, but the valleys and hill-sides afford good pasture, though agriculture, from the nature of the country, is little prosecuted. Four-fifths of S. is drained by the three immense rivers, Obi (q. v.), Yenesei (q. v.), and Lena (q. v.), which traverse the country throughout its whole breadth, and by a number of smaller rivers, all of which flow to the Arctic Ocean; the remainder either belongs to the Caspian and Ural basin, the various lake basins, or is drained by the Amur and other rivers which empty themselves into the Pacific. S. has a large number of lakes, some of which are little else than salt marshes; the largest of them are Lake Baikal (q. v.), Lake Balkash (q. v.), Lake Tchany, Lake Dzaisang, or Saisang, and Lake Issyk-kul. The chief mountain-range of S. is the Altai chain, which forms the southern boundary towards Mongolia, and ramifies eastwards and northwards from the region of Lake Baikal, covering a large portion of the surface of Eastern Siberia. The Stanovoi range stretches from the Amur north-east through Okhotsk; and there are a few ranges of small height in the centre of Siberia. The Yablonnoi Mountains, which have long found a place in books of geography, were shewn by the Russian exploring commission (1863) to have no existence, the place where they were supposed to be situated being an undulating plateau. Among the wild animals of S. are the reindeer in the northern flats, and on the high mountains of the south; the arctic or black fox, and white bear in the north; the sable, ermine, marmot, marten, squirrel, Caspian antelope, and wild sheep—all in the south; and the lynx, wolf, wild-boar, and glutton are generally diffused. Camels are found among the Kirghiz, along with the broad-tailed sheep, the Russian sheep being also domesticated in S.; and horses of good quality, an inferior sort of cattle of the Russian breed, and a large wolfish-looking dog, used chiefly to draw sledges, complete the list of domestic animals. Fresh and salt water fish abound, and feathered game is plentiful in the south. The mineral wealth of S. is great; gold, silver, copper, and lead are found in all the mountainous districts on the west and south; platinum, iron, and precious stones, including diamonds, are found on the eastern slopes of the Ural; zinc, antimony, arsenic, plumbago, and valuable emerald and topaz mines are worked in the districts north of the Amur; and porphyry, malachite, jasper, and salt (from the steppes) are common. More than half of the inhabitants of the central and western provinces are Russians and Poles, or of Russian and Polish descent, and these have been sent to the country either as exiles, on account of political or criminal offences, or as

* More recent acquisitions (which are perhaps only temporary) in Northern Turkestan, have increased the superficies of Siberia to about 5,586,000 English square miles, with a population (1862) of 4,230,938.

government colonies. The most abandoned class of exiles are kept to hard labour in the mines; others are put to less laborious, but still compulsory work; and a third portion are settled in specified districts, under surveillance of the police, and allowed to employ themselves as they choose. This last class chiefly employs itself in trapping those animals whose skins and furs form valuable articles of trade. In the north-west are found the Samoieds, and adjoining them the Ostiaks, both of whom live by hunting and fishing alone. In the south are the nomad tribes of the Kirghiz (q. v.) and Kalmucks (q. v.), both cattle-breeding peoples, though the latter have now partially adopted a settled mode of life, and manufacture iron and gunpowder. Next to them, on the borders of Manchuria, are the Buriats, a people of Mongol origin, and the most numerous tribe in S.; to the north of whom are the Yakuts and Tunguses, of Tartar origin, who are spread over the whole of Eastern S., from the town of Irkutsk to the Stanovoi range; and live mostly by hunting. The Tchuktchis, an Esquimaux race, and the Koriaks inhabit the north-east corner, and the Manchus are the population of the Amur territory. Manufactures are unimportant, and are confined to the principal towns; the barter trade in European goods is carried on at Obdorsk, Ostrovnoe, Yakutsk, and Petropavlovsk; and the transit-trade with China through Kiachta (q. v.), the imports from China being tea of the finest quality, sugar, silk, cotton, wool, grain, fruits, &c.; and the exports to that country, cotton and woollen cloths, linen, furs and skins, leather, and articles of gold and silver. The exports to Russia are the natural produce of the country, and are transported westward to the frontier by alternate land and river carriage, to Tobolsk, thence over the Ural Mountains to Perm. Reindeer sledges are the usual means of transport in winter. Fairs are held at stated periods in certain localities, and much of the trade of the country is there transacted. S. seems to have been first made known to the Russians by a merchant named Anika Stroganoff; and soon after, the conquest of Western S. was effected by the Cossack Vassili Yermak, an absconded criminal, at the head of a numerous band of wild followers. After Yermak's death in 1584, the Russians pursued their conquests eastward, founding Tomsk in 1604, and though they often experienced serious reverses, their progress was rapid, the Sea of Okhotsk being reached in 1639, and Irkutsk founded in 1661. Frequent disturbances have occurred between the Russians and the Chinese and Tartars, which have resulted in the extension southward of the Siberian boundary into Manchuria and Turkestan, but that to the north of Mongolia remains much as it was originally. Eastern S. was little known till recently, and several explorations made under the auspices of the Russian government have done much to increase our knowledge of that still comparatively unknown territory. In 1863, a service of steam-packets was established between Irbit, in Perm, and the towns on the Obi and its tributaries; and more recently, a line of telegraph has been constructed between Moscow and Irkutsk, which it is intended to continue to Behring's Strait, thence by submarine cable to Russian America, and along the Pacific coast down to San Francisco.—See Atkinson's *Oriental and Western Siberia* (London, 1858).

SI'BYL (Gr. *Sibulla*, according to the old derivation from *Dios Boule*; Doric, *Sios Bolla*—the 'Will or Counsel of God'), the name anciently given to several prophetic women, whose history, in so far as they have any, has come down to us in a wholly mythical form, if, indeed, such beings ever existed at all! Their number is differently given; some writers (Ælian, for example) mention only four—the Erythræan, the Samian, the Egyptian, and the Sardian; but in general ten are reckoned, viz., the Babylonian, the Libyan, the Delphian, the Cimmerian, the Erythræan, the Samian, the Cumæan, the Trojan or Hellespontian, the Phrygian, and the Tiburtine. Of these, by far the most celebrated is the Cumæan, identified by Aristotle with the Erythræan, and personally known by the names of Herophile, Demo, Phemonoë, Deiphobe, Demophile, and Amalthæa. She figures prominently in the 6th book of Virgil's *Æneid*, as the conductor of the poet into the realm of the shades. The Roman legend concerning her (as recorded by Livy) is, that she came from the east, and appearing before King Tarquin the Proud, offered him nine books for sale. The price demanded appeared to the monarch exorbitant, and he refused to purchase them. She then went away, destroyed three, and returning, asked as much for the remaining six as for the nine. This was again refused, whereupon she destroyed other three, and once more offered to sell him the rest, but without any abatement of the original price. Tarquin was struck by her pertinacity, and bought the books, which were found to contain advices regarding the religion and policy of the Romans. They were preserved in a subterranean chamber of the temple of Jupiter on the Capitoline, and were originally intrusted to two officials (*duumviri sacrorum*), appointed by the senate, who alone had the right to inspect them. The number of keepers was afterwards increased to 10 (*decemviri*), and finally, by Sulla, to 15 (*quindecemviri*). In the year 84 B. C., the temple of Jupiter having been consumed by fire, the original Sibylline books or leaves were destroyed, whereupon a special embassy was despatched by the senate to all the cities of Greece, Italy, and Asia Minor, to collect such as were current in these regions. This being done, the new collection was deposited in the temple of Jupiter after it had been rebuilt. Spurious Sibylline prophecies—or what were regarded as such—accumulated greatly in private hands towards the close of the Republic; and Augustus, fearing, perhaps, that they might be turned to political uses, ordered them all to be given up to the city-prætor, and burned them. More than 2000 were destroyed on this occasion. The remainder were kept in the temple of Apollo, on the Palatine, under lock and key; but the whole perished during the burning of Rome in the time of Nero. Other collections were made; and as late as the 6th c., when the city was besieged by the Goths, there were not wanting some who pretended to predict the issue from a consultation of these venerable oracles. It is, however, beyond doubt, that as early, at least, as the 2d c. A. D., when enthusiastic men sprung up in the Christian church, prophesying in a poetic-oracular style (whence they were sometimes called *Sibyllists*), the Sibylline books were much interpolated and falsified to assist the progress of the new faith. The utterances of these Christian Sibyllists form a special department of early ecclesiastical literature, and are a mixture of Jewish, Pagan, and Christian ingredients. The collections of them also bear the name of 'Sibylline Books.' An edition was published by Gallæus, at Amsterdam, in 1689, and was entitled *Oracula Sibyllina*; fragments have also been edited by Angelo Mai (Milan, 1817) and Struve (Königsberg, 1818).—Consult Bleek, *Ueber die Entstehung und Zusammensetzung der uns in acht Büchern erhaltenen Sammlung Sibyllinischer Orakel* (in Schleiermacher's *Theologische Zeitschrift*, Berl. 1819), and Thorlacius, *Libri Sibyllistarum Veteris Ecclesiæ* (in his *Prolusiones et Opuscula Academica*, vols. 4 and 5, Copenh. 1821—1822).

SICILIAN VESPERS, the name given to the massacre of the French in Sicily, on the day after Easter (March 30) 1282, the signal for the commencement of which was to be the first stroke of the vesper-bell. In the articles NAPLES, KONRADIN, MANFRED, &c., it is related how Charles of Anjou, the brother of Louis IX. of France, had deprived the Hohenstaufen dynasty of Naples and Sicily, and parcelled out these kingdoms into domains for his French followers; but his cruelty towards the adherents of the dispossessed race, his tyranny, oppressive taxation, and the brutality of his followers, excited among the vindictive Sicilians the deadliest animosity. The aged Giovanni da Procida, a steady partisan of the Hohenstaufen family, took the lead in directing and systematising a conspiracy against Charles and his followers; and after a visit to Pedro of Aragon (the husband of Constance the cousin of Konradin, and the next heir to Naples and Sicily), whom he found willing to undertake the conquest of Sicily, he returned to his self-imposed duty in the island. On the evening of Easter-Monday, the inhabitants of Palermo, enraged (according to the common story) at a gross outrage which was perpetrated by a French soldier on a young Sicilian bride, precipitated the accomplishment of the scheme by suddenly rising upon their oppressors, putting to the sword every man, woman, and child of them, not sparing even those Italians and Sicilians who had married Frenchmen. This example was followed, after a brief interval, by Messina and the other towns, and the massacre soon became general over the island: the French were hunted like wild beasts, and dragged even from the churches, where they vainly thought themselves secure. More than 8000 of them were slain by the Palermitans alone. Only one instance of mercy shewn to a Frenchman is on record, the fortunate subject being a Provençal gentleman, Guillaume des Porcellets, who was much esteemed for his probity and virtue. The governor of Messina also succeeded in passing the strait with his garrison before it was too late. See Amari, *La Guerra del Vespro Siciliano* (Palermo, 1841; reprinted at Paris, 1843), and Possien and Chantrel's *Les Vêpres Siciliennes* (Paris, 1843).

SICILIA'NA, in Music, a name given to a slow, soothing, pastoral description of air, in 6/8 time; so called because the dance peculiar to the peasantry of Sicily possesses this character.

SI'CILY, the largest, most fertile, and most populous island in the Mediterranean Sea, lies between lat. 36° 38′—38° 18′ N., and between long. 12° 25′—15° 40′ E., and is separated from the mainland of Italy by the Strait of Messina. Its shape roughly resembles a triangle (whence the early Greek navigators gave it the name of *Trinacria*, the 'Three-cornered')—the eastern coast, from Capo del Faro in the north to Capo Passaro in the south, forming the base; and the northern and south-western coasts the sides, which gradually approach each other towards the north-west. The length of the base is 145 miles; of the northern side, 215 miles; and of the south-western, 190 miles: the circumference of the island, including the sinuosities of the coast, is estimated at 624 miles. Area about 10,000 sq. miles. Pop., according to the census of 1862, 2,391,802. Capo Passaro, at the south-eastern extremity, is only 56 miles from Malta; and Capo Boco, near Marsala, at the north-western, only 80 miles from Cape Bon on the African coast.

Physical Geography.—The island of S., like the mainland of Italy, is traversed throughout its entire length by a chain of mountains, which may be looked upon as a continuation of the Apennines (q. v.). This chain, beginning at Capo del Faro on the Strait of Messina, runs in a south-south-western direction as far as Taormina, where it turns off to the west, and stretches across the whole island, keeping, however, much nearer to the northern than to the south-western coast. The first part of the chain, from Capo del Faro to Taormina, is called the Peloric range (anc. *Neptunius Mons*), which in Monte Dinnamare attains the height of 3260 feet; the second and much the longer part is called the Madonian range (anc. *Nebrodes Montes*), which, in the Pizzo di Palermo, rises to an elevation of 6328 feet. It forms the great watershed of the island. Towards the north-western coast, the chain breaks up into irregular and often detached masses, such as Monte Pellegrino (1963 feet) and Monte San Giuliano (2184 feet). About the centre of the chain, a range branches off through the heart of the island to the south-east; at first wild and rugged, but afterwards smoothing down into table-lands, which in turn slope away tamely to the sea. There are innumerable other spurs to the south from the great Madonian chain, of inferior length and elevation, but none of these require special mention. The volcano of Etna, which rises in solitary grandeur on the eastern coast, is separately described. See ETNA. S. is not, on the whole, a well-wooded country, but forests of considerable size are found here and there—as, for example, the royal forests near Caronia and Mezzojuso, the forest-zone of Etna, &c.—In the interior of the island there is not much level land, but on several parts of the coast there are extensive plains, generally of great fertility. The principal of these are the great plain of Catania (anc. *Campi Leontini*), out of which rises Etna; the plains of Palermo, termed the *Conca d'Oro*, or 'Golden Shell,' of Castellamare, of Licata, and Terranova.—Although rivers are numerous, none are navigable. The largest are the Simeto or Giarretta, the Cantara, the Salso, the Platani, and the Belici.

Climate.—The climate of S. is very warm, but salubrious, except in low-lying places, where there is a mephitic atmosphere. The best health is enjoyed in the lower region of Etna, which is very densely peopled, although exposed to eruptions and violent earthquakes. The heat is intense in summer when the sirocco blows. After the autumnal equinox, violent winds are prevalent, torrents of rain fall, and all along the coasts the atmosphere is charged with moisture and fogs. The earthquakes begin about the end of winter, and do great damage. Snow and ice are rarely to be seen except on Etna.

Geology and Mineralogy.—The primary rocks in the mountainous districts are chiefly quartz, granite, and mica. In some parts, these are overlaid by limestone rocks. Most of the lower ranges of hills are of calcareous formation, and are rich in metallic ores. Sulphur forms the chief mineral wealth of Sicily. Immense beds of it are found in the central and northern parts of the island. The English export about 42,000 tons of it per annum, and the mines are worked by Cornish miners and their descendants.

Soil, Agriculture, &c.—The soil of the island is so fertile that very little labour is required to raise the crops. In many valleys there is rich soil to the depth even of 40 feet. In Catania, decomposed lava is spread over the ground, greatly increasing its fertility. The crops of grain are large, and might be prodigious if agriculture were better understood; the harvests are such that they recall to mind the words of Livy, in speaking of S.: 'Populoque Romano, pace ac bello, fidissimum annonæ subsidium' (lib. xxvii. 5). In the most ancient times, agriculture was sedulously prosecuted, but it began

to decline when the island was deprived of its independence by the Carthaginians. In more recent times, the restrictions on the exportation of grain served not only to keep agriculture from making any progress, but also to put a drag upon the commerce of the country, which, on every attempt made to raise itself, was met by fresh obstacles in the shape of new taxes. The Italian government has greatly alleviated the obstacles to agriculture, and the salutary effects of the change of system are already apparent. The soil produces corn, maize, flax, hemp; excellent cotton near Mazzara and in Catania; sugar, equal to that of the East Indies, along the southern coast; grapes (350,000 acres), olives (125,000 acres, with an annual yield in oil of 15,000 tuns), saffron, oranges, lemons, citrons, pomegranates, figs, pistachios, dates, castor-oil, mulberry, sumach, tobacco, and manna. The vine has been cultivated with the greatest care at Marsala since 1789, when an English firm settled there began to export it. Now, upwards of 5,000,000 gallons are annually exported to England, America, and India.—S. possesses the best tunny-fisheries in the Mediterranean. The fisheries for coral at different places on the coast are also industriously carried on, and on an average, about 2100 lbs. are annually obtained.

Manufactures, Commerce, &c.—The manufactures of S. are insignificant. Such manufacturing industry as exists is nearly altogether confined to the preparation of silk, cotton, and leather.—The most important articles of export are sulphur, sumach, fruits, and wine; of import, cottons, woollens, silks, linens, earthenware, hardware. Great Britain, France, and the United States are the countries with which the Sicilians chiefly carry on commerce. The total value of the exports in 1862 amounted to £2,830,057; of the imports, to £3,254,903.

Religion, Education, &c.—With the exception of about 58,000 Greeks, and a few thousand Jews, the inhabitants are all Roman Catholics; but though equally ignorant, they are not so superstitious as the Neapolitans; at least their superstition has not destroyed their love of political freedom, as has repeatedly been evinced in their history—most recently in the ardour with which they responded to the summons of Garibaldi to liberate themselves from the tyranny of the Bourbons. There are three universities—at Palermo, Catania, and Messina; and also a Collegio de' Nobilé at Palermo.

Political Divisions.—S. is divided into 7 provinces or prefectures—viz., Palermo, Messina, Catania, Noto or Siracusa, Caltanisetta, Girgenti, and Trapani. Each province is subdivided into 3 or 4 districts, and these again into numerous *communi*, or 'townships.' Over the province is placed an *intendente*, or, as he is now called, a 'prefect;' over the district, a sub-prefect; and over the commune, a *sindaco* ('syndic,' or 'mayor'). The prefect presides over every department of the provincial administration, and also over the provincial council—a body composed of from 15 to 20 landholders, who meet once a year, and sit for 20 days, examining the accounts of the province, and framing the provincial budget. The two subordinate divisions have also their 'councils;' and the members of all three are appointed either by the king or by the prefect. Of course, this insular self-government does not supersede the necessity of sending Sicilian deputies to the national parliament at Florence.

History.—S. was inhabited, in pre-historic times, by a people who bore the name of *Siculi* or *Sicani*, and who—according to a universally received tradition—crossed over into the island from the southern extremity of the mainland. Their names and every fact that we can ascertain about them, lead to the supposition that they were members of the great Latino-Italian family that, entering Italy from the north, gradually pushed its way across the Apennines to the peninsula of Bruttium (see article ROME). Beyond this rational conjecture, however, we cannot proceed, and the actual history of S. only begins to emerge out of utter darkness with the establishment of Greek and Phœnician colonies. The earliest Greek colony, that of Naxos, was founded 735 B. C.; the latest, that of Agrigentum, 580 B. C. During the intervening century and a half, numerous important colonies were established (either directly from Greece or as offshoots from the older Greek settlements in the island); Syracuse (734 B. C.), Leontini and Catana (730 B. C.), Megara Hyblæa (728 B. C.), Gela (690 B. C.), Zancle, later Messana (date of origin uncertain), Acræ (664 B. C.), Himera (648 B. C.), Mylæ (date of origin uncertain), Casmenæ (644 B. C.), Selinus (628 B. C.), Camarina (599 B. C.), Agrigentum (580 B. C.). The earlier history of these cities is almost unknown. What is recorded is vague and general. We read that they attained great commercial prosperity, that they subjugated or wrested from the Siculi, Elymi, and other 'native' tribes, large portions of neighbouring territory; and that their governments (like those of the republics in the mother-country) were at first oligarchical, and latterly democracies or 'tyrannies;' but it is not till the period of the 'despots' that we have detailed accounts. Then the cities of Agrigentum and Gela acquire prominence—the former, under the rule of Phalaris (q. v.), becoming, for a short time, probably the most powerful state in Sicily; and the latter, under a succession of able tyrants, Cleander, Hippocrates, and Gelon (q. v.), forcing into subjection most of the other Greek cities. Gelon, however, transferred his government to Syracuse (one of his conquests), which now became the principal Greek city of Sicily—a dignity it ever after retained. Contemporary with Gelon, and possessed of the same high capacity for governing, were Theron, 'tyrant' of Agrigentum, and Anaxilaus, tyrant of Rhegium, and conqueror of Zancle, to which he gave the name of Messana. Meanwhile, the Carthaginians—a people wholly different from the Greeks in language, religion, origin, and civilisation—had obtained possession of the Phœnician settlements in Sicily. The first appearance of the Carthaginians in the island dates from 536 B. C.; but the steady growth of the Greek cities in wealth and power, long confined their rivals to the north-western part, where their principal colonies were Panormus, Motya, and Soloeis. The first open trial of strength took place in the great battle of Himera, where the Carthaginian army was utterly routed by Gelon, and its leader, Hamilcar, slain. The Gelonian dynasty at Syracuse fell 466 B. C., after experiencing various fortunes. During the next fifty years, the island had peace. In 410 B. C., however, the war between the Carthaginians and Greeks for the possession of the island was renewed. The successes of the former were great and permanent. Selinus, Himera, Agrigentum, Gela, and Camarina, fell into their hands in less than five years; and it was not till Syracuse had got a new 'tyrant,' the famous Dionysius (q. v.) the Elder, that fortune again began to smile on the Greeks. Even he, however, could not wrest from the Carthaginians what they had already won; and after the war of 383 B. C., a peace was concluded, which left Dionysius in possession of the eastern, and the Carthaginians of the western, half of the island. The dissensions and tumults that followed the decease of Dionysius, illustrate forcibly the peculiar dangers to which the Greek republics, either at home or abroad, were prone; but we can

only afford to notice the triumph of the popular party under Timoleon (343 B. C.), and the splendid victory of the latter over the Carthaginian generals, Hasdrubal and Hamilcar, at the river Crimisus, 340 B. C. Once more Greek influence was in the ascendant, but the rule of the bold and ambitious tyrant Agathocles (317—289 B. C.) proved in the main disastrous to Greek supremacy. After his death, Syracuse lost her hold over many of the Greek cities, which established a weak and perilous independence, that only rendered the preponderance of the Carthaginians more certain. Finally, Pyrrhus (q. v.), king of Epirus, was invited over to help his countrymen, and in 278 B. C. he landed in the island. The brilliant adventurer—one of the most romantic figures in classic history—for a time swept everything before him. Panormus, Erete, and Eryx were captured; and though he failed to make himself master of Lilybæum, he might probably have forced the Carthaginians to surrender it, had he not been thwarted in his designs by the miserable discords and jealousies of the people whom he came to save. As it was, Pyrrhus left Sicily in about two years; and in all likelihood the island would have sunk into a Carthaginian possession, had not a new power appeared on the stage—viz., the Roman. The struggle for supremacy between Rome and Carthage—the most tremendous struggle in ancient history—is sketched in the article ROME, and in the biographies of the leading generals, and therefore need not be narrated here. Suffice it to say, that in 246 B. C., Carthaginian S., and in 210 B. C., the whole island, became a Roman 'province'—the first Rome ever held. Henceforth it shared the fortunes of the great state to which it was annexed, and its special history need only be rapidly glanced at. In 135—132 B. C., and again in 103—100 B. C., it was the scene of two formidable slave-insurrections, during which it was frightfully devastated. Its fertility, and the wealth of its citizens and landholders, were also powerful temptations to greedy and unscrupulous governors, of whom we have a specimen in Verres (prætor 73—70 B. C.), 'damned to everlasting fame' in the Orations of Cicero. Augustus visited S. after the close of the civil wars, and established some colonies; but it does not seem to have prospered under the empire; and in 440 A. D. it was conquered by the Vandals under Genseric. The Vandals, in their turn, were compelled to cede it (480 A. D.) to Theodoric, king of the Ostrogoths, in whose hands it remained till 535 A. D., when Belisarius conquered and annexed it to the Byzantine empire. In this condition it remained till 827, when the Saracens invaded the island, and after a protracted struggle, lasting for 114 years, expelled the Byzantine Greeks, and made themselves masters of Sicily. They kept possession of it for upwards of a century, but after a contest of 30 years, were driven out by Robert Guiscard (q. v.) and Roger de Hauteville (q. v.), at the head of a body of Normans, aided by the 'native' inhabitants, whom we conjecture to have been much the same as they were in the old classic times—for the successive waves of barbaric and Saracenic invasion that swept over the island, appear to have left little trace of their action. Even to this day, it is highly probable that the people of S. are largely the descendants of the early Siculi. The Normans held rule in the island from 1072 to 1194; and the Norman 'Kingdom of Sicily and Naples,' or 'Kingdom of the Two Sicilies,' dates from 1130, when Roger II. obtaining possession of most of the continental dominions of his uncle, Robert Guiscard, assumed the title of king. During the rule of the Swabian dynasty (see HOHENSTAUFEN, HOUSE OF), 1194—1258, the political history of S. is the same as that of Naples; but in 1282, after the dreadful massacre of the French, known as the Sicilian Vespers (q. v.), it again became independent, chose for its king Pedro III. of Aragon, who was the sole representative by marriage of the House of Hohenstaufen, and remained in the possession of the Aragonese sovereigns till 1505, when the union of the crowns of Castile and Aragon—in other words, the rise of the Spanish monarchy in the persons of Ferdinand and Isabella, placed it under the dominion of Spain. The fortune of war also gave Ferdinand the possession of Naples; and the Spanish kings retained both countries (which they governed by viceroys), until the *War of the Spanish Succession* (q. v.) (1700—1713). By the treaty of Utrecht (1713), S. was separated from Naples; and handed over to Victor Amadeus, Duke of Savoy, who, however, restored it to the crown of Naples by the treaty of Paris, seven years after, receiving in exchange the island of Sardinia. From 1720, the two countries continued under the same dynasty, the House of Austria, 1720—1734; and the Spanish Bourbons, 1734—1860 (if we except the brief rule of the French in Naples, 1806—1815, when Joseph Bonaparte, and afterwards Joachim Murat, were kings), down to the period of Garibaldi's invasion (see ITALY, and GARIBALDI), which resulted in the annexation of both to the new kingdom of Italy under Victor Emmanuel.

SICULIA'NA, a city of Sicily, province of Girgenti, and 8 miles west-north-west of the city of that name. It stands on the sea, and has a small, badly-situated harbour. Pop. 5981.

SI'CYON, the principal city of a very small but exceedingly fertile state of ancient Greece, Sicyonia, situated in the north of the Peloponnesus, having the Corinthian Gulf for its northern boundary, with Achaia on the W., Phlius on the S., and Corinth on the E. The territory was level towards the sea, somewhat mountainous in the interior, and well watered by the two rivers Asopus and Helisson, between which, on a triangular plateau, was situated S., about two miles south of the Corinthian Gulf, and ten north-west of Corinth. Round the three sides of the plateau ran a wall, which, combined with the precipitous nature of the heights that surrounded it, rendered the position of S. one of great strength. It is supposed that at one time it had, like Athens, a double wall reaching from the city to the port on the Sea of Corinth. S. was anciently celebrated as a chief seat of painting and statuary (tradition asserting that the former was invented there), it having given its name to a school of painting which included among its disciples Pamphilus and Apelles, both natives of Sicyon. It was also the native city of Aratus (q. v.), the general of the Achæan League. There exist at the present day a few remains of the ancient city, as well as of the more modern buildings erected by the Roman conquerors of Greece, near which stands a small modern village named *Vasilika.*

SIDA, a genus of plants of the natural order *Malvaceæ*, containing a large number of species, annual and perennial herbaceous plants and shrubs, mostly natives of warm climates, and widely diffused. They generally abound in mucilage, and some of them are used in medicine in India, as the Mallow and Marsh-mallow are in Europe. They have also strong pliable fibres, which are employed for cordage and for textile purposes.—*S. tiliæfolia*, an annual, has long been cultivated in China, where it is called *King-Ma*, for the sake of its fibre, which is used like that of hemp. It is too tender for the climate of Britain, but its cultivation has been introduced into Italy and France.

SIDDONS, Mrs Sarah, was the daughter of Mr Roger Kemble, a provincial actor, and was born at Brecon, in South Wales, on July 5, 1755. As a mere child, she was brought on the stage on the occasion of a benefit of her father's; and from that time up to her 15th year, she continued to act as a regular member of his company. An attachment having sprung up between her and a young Mr Siddons, an actor, with the somewhat reluctant consent of her parents, she was married to him at Trinity Church, Coventry, on 26th November 1773, and in company with her husband, went to act at the Cheltenham theatre. Here she speedily drew great attention; and Garrick, hearing her praises in London, sent to Cheltenham a trusty emissary to report upon her. The result was an engagement offered her at the London Drury Lane Theatre, where, 29th December 1775, she made her first appearance, acting Portia in *The Merchant of Venice* to the Shylock of Mr Garrick. Her beauty and fine person pleased the audience, but as an actress she made no great impression, and at the close of the season she failed to secure a re-engagement. It was considered that this was to some extent due to her having vexed the irritable vanity of Garrick by an unintentional error in stage business, which made him act with his back to the public in one of his pet passages, a mortification which the great man was little enough to remember and resent.

Leaving London thus in failure in 1776, in 1782 she returned to it, to run a career of triumph as indisputably the greatest actress of her time. The intervening years she had passed in the exercise of her art on the stages successively of Birmingham, Manchester, York, and Bath, till the growth of her provincial reputation determined her recall to the metropolis. In 1784, her popularity was temporarily obscured by a calumny industriously circulated, which charged her with ungenerous and illiberal conduct towards certain of her fellow-performers; but with this trivial exception, till on the 29th June 1812, in her great character of Lady Macbeth, she took her leave of the public, her course was one long series of successes. Subsequently, she occasionally consented to reappear on the stage for charitable ends, or to promote a stage 'benefit,' in which she had a kindly interest. Her death took place in London, on the 8th June 1831.

As a tragic actress, Mrs S. has probably never in this country been equalled; as a woman, she was of unblemished reputation, and enjoyed the respect of all who knew her. She was the ornament of every society into which she went, and such was the estimation in which she was held, that she had access at will to almost any. Her genius is said to have been strictly a *stage* genius; elsewhere, she seems to have been a woman of no extraordinary parts. But she had a certain way of making her mediocrities imposing. She carried her tragedy manners with her to the drawing-room or the dinner-table: Scott has recorded the amusement with which at Abbotsford he heard her stately blank verse to the domestic:

'I asked for water, boy! you've brought me beer;'

and Sidney Smith used to say, it was never without a certain awe that he saw her '*stab the potatoes*.'

SIDE-BONES are enlargements situated above a horse's heels, resulting from the conversion into bone of the elastic lateral cartilages. They occur mostly in heavy draught horses with upright pasterns, causing much stiffness, but, unless when of rapid growth, little lameness. They are treated at first by cold applied continually, until heat and tenderness are removed, when blistering or firing must be resorted to.

SIDE'REAL CLOCK, a clock so regulated as to indicate *sidereal time*. See Day. The sidereal clock is a most important aid to the practical astronomer, and is one of the indispensable instruments of an observatory.

SIDERO'GRAPHY (Gr. *sideros*, iron). The name applied by the inventor, Mr Dyer, to a process of printing with compound iron (or rather steel plates, for they are case-hardened after engraving) plates, instead of plain plates of copper or steel. It is the plan now usually employed in printing banknotes in which more than one colour is given. The coloured parts of the design are cut out of the main plates, and movable pieces are exactly fitted in, so that they can be retracted or pushed forward at will. They are withdrawn whilst the main plate is receiving its ink, and they are pushed forward beyond whilst receiving their supply of ink. This being done, they are brought to one plane, and form a complete plate for printing from.

SIDERO'XYLON, a genus of trees of the natural order *Sapotaceæ*, having evergreen leaves and axillary clusters of flowers, natives of warm climates, and very widely distributed. They are remarkable for the hardness of their wood, which is sometimes called Iron-wood, and is at least in some species so heavy as to sink in water. The wood of *S. inerme*, called *Melkhout* at the Cape of Good Hope, is there much used for making boats, bridges, agricultural implements, &c.

SI'DI-BEL-A'BBÈS, a town of Algeria, in the province of Oran, and 50 miles south of the town of that name. It is fortified, and contains barracks, telegraph and post offices. Markets take place here every week. The soil in the vicinity is fertile; grain, tobacco, and fruit are the chief products. Pop. (1864) of commune, 6458.

SI'DLAW HILLS. See Forfarshire and Birnam.

SI'DMOUTH, a market-town and watering-place on the south coast of Devonshire, at the mouth of the little river Sid. S. was a borough and market-town, governed by a port-reeve, as early as the 13th century. It was anciently a place of some importance as a fishing-town and seaport, but the fishery has declined, and the harbour is in great measure filled up with sand and shingle, so that it is now accessible to small boats only. The town has for many years past been a favourite watering-place, remarkable for the mildness and salubrity of its climate. The hills on each side of the valley of the Sid rise to a considerable height, and, where they terminate on the sea-coast, form bold and lofty cliffs, east and west of the town, known respectively as Salcombe Hill and High Peak, about 500 feet above the sea. Owing to the narrowness of the valley, the town presents no large frontage towards the sea; but the esplanade, protected by a sea-wall, 1700 feet in length, built in 1838 to stop the encroachment of the sea, forms an excellent promenade. Villas and detached houses extend for some distance inland, up the valley of the Sid, on both sides of the stream. The town is neatly, though irregularly built, lighted with gas, and paved, and contains baths, public rooms, &c. Pop. (1861), parish, 3354; town, 2572. Some Roman remains have been found here. S. gives the title of viscount to the Addington family.

SIDNEY, Sir Philip, the son of Sir Henry Sidney, and Mary, sister to Robert Dudley, the favourite of Queen Elizabeth, was born at Penshurst, in Kent, on 29th November 1554. When ten years old, he was sent to school at Shrewsbury,

whence, in 1569, he went to Christchurch, Oxford. From Oxford, he passed to Cambridge, which he left with a high reputation for scholarship and general ability. In 1572, as the custom then was for young men of rank, he went abroad on his travels. He was in Paris when the Massacre of St Bartholomew took place, and narrowly escaped being one of its victims. Thereafter, he visited Belgium, Germany, Hungary, and Italy; and in 1575, he returned home, perfected in all manly accomplishments. His uncle, Dudley, Earl of Leicester, was at this time in the zenith of his fortunes, and for S. a court-career lay temptingly open. As a courtier, his success was great; and with Queen Elizabeth he became, and continued while he lived, a special favourite. In 1576, as a mark of her approval, he was sent on an embassy to the court of Vienna, from which he returned in the course of the year following. Shortly after, he had the boldness to address to the queen a 'Remonstrance' against her proposed marriage with Henry, Duke of Anjou, a union to which she seemed herself not indisposed. It is significant of the high favour in which he was held by her, that Elizabeth, imperious as she was in temper, and little inclined to brook such interference, seems scarcely at all to have in this instance resented it. About this time, a quarrel with the Earl of Oxford led to S.'s temporary retirement from court, during which, at Wilton, the seat of his brother-in-law, the Earl of Pembroke, he wrote his celebrated *Arcadia*. In 1583, he consoled himself for the marriage of Lady Penelope Devereux, to whom he had been ardently attached, and who figures as the Stella of his poems, by himself marrying Frances, the daughter of Sir Francis Walsingham. By this lady, he had one daughter, who survived him. In the spring of 1585, he is said to have meditated sailing with Sir Francis Drake in an expedition against the Spaniards in the West Indies, but to have been expressly forbidden by Elizabeth, on a ground of anxiety 'lest she should lose the jewel of her dominions.' It does not seem nicely consistent with this pretty story, that later in the same year she appointed him governor of Flushing, whither he went to take part in the war then being waged between her allies, the Hollanders, and the Spanish. As it proved, she thus sent him to his death. At the battle of Zutphen, in Gelderland, after behaving with conspicuous gallantry, and having a horse killed under him, he received a musket-shot in the thigh, and after lingering for some days in great suffering, he died at Arnheim on the 7th October 1586, in the 33d year of his age. A beautiful trait of humanity is recorded of him as he was being borne wounded from the field. He complained grievously of thirst, and a bottle of water was procured for him, from which, as he was about to drink, he was touched by the wistful look up at it of a mortally wounded soldier, who lay close by, and taking it untasted from his lips, he handed it to his fellow in need, with the words: 'Thy necessity is yet greater than mine.' The estimation in which S. was held by his countrymen was shown in the passion of grief with which the news of his death was received. His body was brought to England, and after lying for some time in state, was buried with great solemnity in the old cathedral of St Paul's, a general mourning on the occasion being observed throughout the country. The universities issued three volumes of elegies on his death, and Spenser, in his *Astrophel*, mourned for the loss of one who as a friend had been dear to him.

The love and admiration which S. won from his contemporaries was mainly a tribute to the singular beauty of his character. His short life was illustrated by no brilliant achievement; and his literary genius, though true and exquisite in its kind, would scarcely of itself have sufficed to account for the fervour of regard he inspired. But the purity and nobility of his nature, and the winning courtesies in which its gentle magnanimity expressed itself, took captive all hearts whilst he lived, and have since kept sweet his memory. 'Sublimely mild, a spirit without spot,' he lives in the history of his country, as a rare and finished type of English character, in which the antique honour of chivalry is seen shading into the graces of the modern gentleman. His *Arcadia*, overrun as it is with the fantastic affectations of the time, may still be recognised by the reader who has patience to peruse it, as a work of indisputable genius, flushed with the lights of a fine imagination, and in its purity and tenderness of sentiment, giving an authentic reflex of the lovely moral nature of the writer. His other chief work, the *Defense of Poesie*, published in 1595, after all that has since been written in the way of philosophical exposition on this and cognate subjects, will even now be found to repay the attention of the reader. Many of his shorter poems, more especially some of his sonnets, are also of rare merit. See Fulke Greville's Biography of S., Zouch's Memoirs of S. (1808), and H. R. Fox Bourne's *Memoirs of Sir Philip Sidney* (1862).

SIDNEY, or SYDNEY, ALGERNON, grand-nephew of the famous Sir Philip Sidney, was born in the year 1622. He received a careful education, and accompanied his father, the Earl of Leicester, to Denmark and France, whither the latter had been sent on embassies. In 1641, he served with some distinction against the rebels in Ireland, of which country his father was then Lord-lieutenant for the king. Subsequently, in 1643, along with his elder brother, the Viscount Lisle, he crossed to England, ostensibly to take service under the king, then at war with his parliament. The two brothers, however, on their arrival, joined the parliamentary forces. At the battle of Long Marston Moor, in which he was sharply wounded, Algernon's courage and capacity were conspicuous; and in evidence of the estimation in which he came to be held by his party, we find him, in 1646, Lieutenant-general of the Horse in Ireland, and governor of Dublin; and subsequently, in 1647, after receiving the thanks of the House of Commons for his services, appointed governor of Dover. The year before, he had been returned to parliament as member for Cardiff. In 1648, he was one of the judges at the king's trial, and though, for some reason not explained, he neither was present at the passing of sentence, nor signed the warrant of execution, his general approval of the proceedings is not doubted. He is reported to have afterwards spoken of the execution as 'the justest and bravest action that ever was done in England or anywhere else.' In principle a severe republican, he resented the usurpation of power by Cromwell, and during the Protectorate lived in retirement at the family seat of Penshurst, in Kent. In 1659, on the meeting of the restored parliament, S. was again in his place. He was nominated one of the Council of State, and shortly after despatched to Denmark on a political mission. After the Restoration, he lived precariously on the Continent, flitting about from place to place, but in 1677, a pardon was procured him from Charles II., and he returned to his native country. Nevertheless, he was still obdurately republican in his opinions, and it is undoubted that he schemed for the overthrow of the monarchy, and the establishment of a republic in its stead; for this end he solicited the

aid of the French monarch, and there is evidence of his having been supplied with money by Barillon, the French ambassador. Obscurely his designs were suspected, and in June 1683, when the Rye House Plot was announced, the opportunity was seized to get rid of a man felt to be dangerous. Along with his friend Lord Russell and others, he was arrested, and committed to the Tower. On the 21st November, he was tried for high treason before the brutal Jefferies, and on the merest mockery of evidence, found guilty, and condemned to die. On the 7th of December he was beheaded on Tower Hill. He met his death with heroic firmness, amid general sympathy and indignation. He has ever since enjoyed a sort of canonised reputation as a patriot hero and martyr, and it cannot be held undeserved, narrow and impracticable as we must admit his views to have been. In the history and theory of government, S. was more deeply learned than any man of his time. His *Discourses concerning Government* were first published in 1698; in 1704, another edition was issued, a third appeared in 1751, and the fourth in 1772. S.'s life has been written by S. W. Meadley (Lond. 1813). See also Blencowe's *Sidney Papers* (Lond. 1813).

SIDNEY SUSSEX COLLEGE, Cambridge, was founded in 1598 by Lady Frances Sidney, Countess of Essex, or rather by her executors, in obedience to the instructions of her will. They obtained of Queen Elizabeth a mortmain for the purpose, and purchased of Trinity College the site of the ancient convent of Franciscans, or Gray Friars. There are 13 fellowships.

SI'DON (Hebr. Zidon, perhaps 'fishing-place'), anciently, a city of Phœnicia, situated on the east coast of the Mediterranean, in lat. 33° 34′ 5″ N., 45 miles south of Berytus. It was built on a rising mound, protected by the sea on the north and west; while the bed of a river formed a natural fosse to the south, and the high hills shielded it to the east; a double harbour gave shelter to its ships both in summer and winter. It soon rose, both by its exceptional position and the daring and enterprising character of its inhabitants, to the highest rank among the cities of Phœnicia (q. v.), so that the whole country is sometimes designated by the name of S.. 'the Great,' 'the Metropolis.' The extensive commerce of S. is well known from ancient authorities. Its colonies extended over the coast of Asia Minor and the adjacent islands, the coast of Thrace and Eubœa, and even some parts of Sicily, Sardinia, Spain, the coast of Cornwall and the Baltic shores, the northern parts of Africa, and, in fact, nearly the whole of the ancient world. Their manufactures of glass and linen, purple dye and perfumes, were sources of unbounded wealth; and, whether they were the skilful workers, or merely the exporters and traders of those 'divine' works in gold and silver, ivory and bronze, which were the marvel of both Greeks and Hebrews, so much seems certain, that they managed to be considered unanimously the most skilful workmen of their time. Although one of the cities assigned to the Israelites by Joshua, it never in reality belonged to them, but, on the contrary, was every now and then in arms against them, either singly, or in league with some of their deadliest enemies, and even subjugated them for a time. After being conquered itself by Tyre, the daughter-city, it attempted to throw off the yoke at the invasion of Phœnicia, by Shalmanezer, to which king it surrendered. Under Assyrian, Chaldean, and Persian domination, it retained a kind of independence for its internal affairs, and under the Persians, actually reached its highest prosperity. But an unsuccessful revolt against that power, under Ochus, ended in its temporary ruin (351 B.C.). Speedily rebuilt and repeopled, it opened its gates to Alexander the Great (333 B.C.), and from that time forth it fell successively into the hands of Syrian, Greek, and Roman rulers. Through the middle ages, little is heard of it, except that it was taken by the Crusaders. During part of the 17th and 18th centuries, it again became an important place of commerce; but misrule and violence put an end to its rising prosperity, and the number of its inhabitants has sunk to about 5000. There is still some little export of silk, cotton, and nut-galls. It is now called Saida, occupies a place somewhat to the west of the ancient city, and belongs to the Turkish pashalic of Acre. See PHŒNICIA.

SIE'BENBURGEN (Seven Boroughs), the German name of the Austrian crown-land of Transylvania (q. v.).

SIE'BENGEBIRGE, a collection of conical heights in Rhenish Prussia, on the right bank of the Rhine, about 22 miles above Cologne. The highest of the peaks is the Löwenkopf or Löwenberg, 1560 feet high; but the most famous is the Drachenfels (q. v.).

SIEGE (Fr. a seat, a sitting down), is the sitting of an army before a hostile town or fortress with the intention of capturing it. With certain elements, the success of a siege is beyond doubt; the result being merely a question of time. These elements are: first, the force of the besiegers shall be sufficient to overcome the besieged in actual combat, man to man. If this be not the case, the besieged, by a sortie, might destroy the opposing works, and drive away the besiegers. The second element is, that the place must be thoroughly invested; so that no provisions, reinforcements, or other aliment of war can enter. The third element is, that the besiegers be undisturbed from without. For this it is essential that there shall not be a hostile army in the neighbourhood; or if there be, that the operations of the besiegers be protected by a covering army able to cope with the enemy's force in the field. The ancients executed gigantic works to produce these effects. To complete the investment, they built a high and strong wall around the whole fortress; and to render themselves secure from without, they built a similar wall facing outwards, beyond their own position. The first was circumvallation, the second contravallation. It was thus that Cæsar fortified himself while besieging Alexia, and maintained 60,000 men within his ring. In modern warfare, it is considered preferable to establish strong posts here and there round the place, and merely sentries and videttes between.

Let us now assume that a fortress of great strength has to be reduced, and that the force of the enemy in the vicinity has been either subdued or held in check by a covering army. By rapid movements, the place is at once invested on all sides. This step constitutes merely a blockade; and if time be of little importance, is a sufficient operation, for hunger must sooner or later cause the fortress to surrender; but if more energetic measures are required, the actual siege must be prosecuted. Advantage is taken of any hidden ground to establish the park of artillery and the engineers' park; or if there be none, these parks have to be placed out of range. The besieging force is now encamped just beyond the reach of the guns of the fortress; and their object is to get over the intervening ground and into the works without being torn to pieces by the concentrated fire of the numerous pieces which

the defenders can bring to bear on every part. With this view, the place is approached by a series of zigzag trenches so pointed that they cannot be enfiladed by any guns in the fortress. In order to accommodate the forces necessary to protect the workers, the trenches at certain intervals are cut laterally for a great length, partly encircling the place, and affording safe room for a large force with ample battering materiel. These are called *parallels*, and they are generally three in number. The distance of the first parallel will increase as small-arms become more deadly; but with smooth-bore muskets it has been usual to break ground at 600 yards from the covered-way of the fortress, while in the case of Sebastopol, ground was broken at 2000 yards. The engineers having, by reconnaissances, decided the locality of the parallel, and taken advantage of any inequalities of surface, a strong body of men is sent to the spot soon after nightfall. The attention of the garrison is distracted by false alarms in other directions. Half the men are armed cap-à-pie, and lie down before the proposed parallel; while the other half, bearing each pick and shovel, and two empty gabions, prepare for work. Each man deposits the gabions where the parapet of the trench should be. He then digs down behind them, filling the gabions with the earth dug out; and, after they are filled, throwing it over them, to widen and heighten the parapet. Before daylight, the working-party is expected to have formed sufficient cover to conceal themselves and the troops protecting them. During the day, they—being concealed from the garrison—widen and complete their parallel, making it of dimensions sufficient to allow of wagons and bodies of troops with guns passing along. During the same night, other parties will have been at work at zigzags of approach from the depôts out of range to the first parallel, which zigzags will be probably not less than 1000 yards in length. The profile of a completed trench is shewn in fig. 1, the shaded



Fig. 1.—Profile of a Trench.

portion representing a gabion. As a rule, the defenders will not expend ammunition on the first parallel, for its extent (often several miles) will render the probability of doing material damage extremely small. For this reason also, the dimensions of the parapet and its solidity are of far less importance in the first parallel than in the more

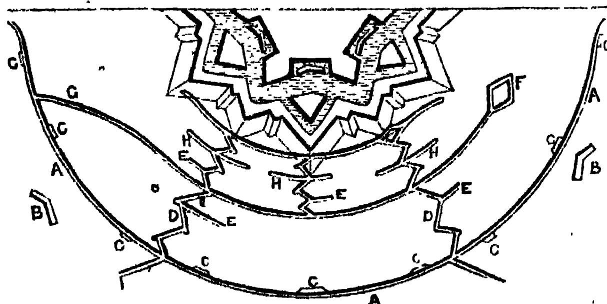


Fig. 2.—Siege Works.

advanced works of attack. The first parallel, AAA, fig. 2, being completed, the engineers select points near its extremities, at which they erect breastworks, B, B, to cover bodies of cavalry, who are kept at hand to resist sorties from the garrison. The length of the parallel is usually made sufficient to embrace all the works of two bastions at least. Sites are then chosen for batteries, C, C, which are built up of fascines, gabions, sandbags, and earth. They are placed at points in the parallel formed by the prolongation of the several faces of the bastions, ravelins, and other works of the fortress, which faces the batteries are severally intended to enfilade by a ricochet fire. Other batteries will be formed for a vertical fire of mortars. By these means it is hoped that the traverses on the hostile ramparts will be destroyed, the guns dismounted, and the defenders dispersed, before the final approaches bring the assailants to the covered-way. The sappers will now commence their advance towards the points, or salient angles, of the two bastions to be attacked. If, however, the trench were cut straight towards the fortress, its guns could easily destroy the workmen, and enfilade the approach. To prevent this, it is cut in short zigzags—as at D—the direction always being to a point a few yards beyond the outmost flanking works of the garrison. The side of each trench nearest the fortress is protected by gabions and sandbags, as in the case of the parallel. At intervals, short spurs of trench, incipient parallels, are cut, as at E, to contain small-arms-men, to act as guards to the sappers. The second parallel is about 300 yards from the enemy's works, and has to be more strongly formed than the first. It often terminates in a redoubt, F, to hold some light artillery, and a strong force of infantry, who could assail any sortie in flank; or it may run into the first parallel, as G, giving easier access for troops than through the zigzags. The second parallel is revetted with sandbags, in which loopholes are left for musketry. After passing the second parallel, the angles of the zigzags become more acute, to prevent enfilading. At about 150 yards, certain demi-parallels, H, are cut, and armed with howitzer batteries, to clear the covered-way, while riflemen also act from it. The third parallel is at the foot of the glacis. Thence the place, after being sufficiently battered, is taken by a storming-party, who make their way over the glacis, or the covered-way, is topped by the double sap, as in fig. 3; which is a safer plan for the army generally, though much more deadly to the sappers. When the crest of the covered-way has thus been reached, batteries of heavy artillery will be there established, for the purpose of breaching the walls of the ravelin and bastion; while at the same time miners will first seek to destroy the defenders' counter-mines (which would otherwise be likely to send these batteries into the air), and then will excavate a tunnel to the ditch, at the foot of the counterscarp. If the breach becomes practicable, a storming-party will emerge from this tunnel or gallery, and seek to carry the opposite work by hard fighting. If inner works still subsist, which would tear assailants to pieces, the double sap may be continued across the ditch, if a dry ditch, right up the breach, that counter-batteries may be formed. If the ditch be wet, means must be adopted for a causeway or a bridge. By these means, however obstinate may be the defence, if the besieging force be sufficiently strong, and aid do not arrive from without, the ultimate success of the


Fig. 3.—Double Sap.

attack becomes certain. Vauban raised attack to a superiority above defence, first, by the introduction of ricochet fire, which sweeps a whole line; and secondly, by originating parallels. Before his time, the whole attack was conducted by zigzag approaches; in which the troops actually in front could be but few, and were therefore unable to withstand strong sorties of the garrison, who, in consequence, frequently broke out and destroyed the works of the besiegers, rendering a siege an operation of a most uncertain character.

SIEGE-ARTILLERY is heavy ordnance used for battering purposes, and of too weighty a character to take the field. A siege-train of guns and their ponderous ammunition is usually maintained in the rear of an army, ready to be brought up for use when required.

SIE'GEN, a manufacturing town of Prussia, in Westphalia, stands on the Sieg, 38 miles south-south-west of Arnsberg. In 1862, it had 8230 inhabitants, who are engaged in manufacturing leather, cotton, and woollen goods. S. is also said to produce the best iron in the west of Germany. In the vicinity are numerous iron mines and smelting furnaces. Its iron and steel wares are noted; especially its files, of which 400 different sorts are said to be manufactured.

SIEGFRIED. See Nibelungenlied.

SIE'NA, a city of Central Italy, 60 miles south of Florence by railway. Pop. 22,624. It is situated on three little hills, separated from each other by three valleys, and higher than the other hills which surround them. Its climate is on this account very salubrious, notwithstanding the deficiency of water caused by its elevated position; to remedy which, subterranean aqueducts had been excavated, five miles in length, some of them dating as far back as the Roman dominion. Its environs are not beautiful, consisting of naked clay-hills, capped with sandstone, but the city is surrounded by trees and avenues, which have a fine effect. The handsome square, Piazza del Campo, is one of the finest in Italy. Eleven streets lead out of it, and it is surrounded by handsome buildings. In this square there is also the famous tower called the *Mangia*, of prodigious height; there are also other towers here and there, seen from a great distance—remnants of the habitations of the feudal lords. The streets are narrow, some paved with tesselated bricks, and others flagged. There are many ancient Gothic palaces, not remarkably handsome. In the Piazza del Campo stands the Palazzo Pubblico, built in the 13th c., in which there are magnificent rooms, and paintings by eminent artists. S. has a fine cathedral, erected, it is said, on the foundations of the Temple of Minerva, begun in 1059; the façade built in the 13th century. It is faced with black and white marble, and is covered with ornaments and sculptures. The pavement is of marble tesselated, representing many biblical subjects. In the different chapels, and in the baptistery, there are frescoes, paintings, and statues, by a number of distinguished masters. The other churches are also rich in works of art. Of the many oratorios, the most noteworthy is that of St Catharine (q. v.), occupying the house of the saint. S. is an archiepiscopal see. There are numerous manufactories of woollen goods, as also of leather and of paper; and in its neighbourhood there are many marble quarries. There is a university, founded in 1330, famous especially as a school of medicine, which has sometimes as many as 200 students. It revived greatly after the abolition of the university of Pisa, in 1849. The Italian spoken at S. is reckoned among the purest.

S. was founded as a Roman colony in the time of Julius Cæsar, under the name of Sena, or Sena Julia. There are no remains of antiquity; and it does not appear to have been a place of any consequence until the middle ages, when it became one of the powerful city republics of Italy. It embraced the Ghibelline cause, and in conjunction with the forces of Pisa, defeated the Tuscan Guelfs, in the memorable battle of Monte Aperto (1260). At the height of its greatness, it is said to have contained 200,000 inhabitants. S. produced a 'school' of artists, of whom the most distinguished names are Guido da Siena, Simone Memmi, Sodoma, Beccafumi, and Baldassare Peruzzi.

SIENNA EARTH. See Burnt Sienna.

SIE'RRA, a name applied in Spain, and in countries in which the Spanish language has prevailed, to a ridge of mountains. The word means *saw*, and is descriptive of the notched or saw-like sky-line of certain mountain-ranges.

SIE'RRA LEO'NÉ (Mountain of the Lion), a British colonial settlement on the Sierra Leone coast, Western Africa. The settlement consists chiefly of a peninsula, about 25 miles long, from north to south, and 12 miles broad; but several islets, as the Isles de Loss and the Banana Islands, belong to it. Area, according to the latest government returns, 300 sq. m.; pop. in 1860, 41,264, of whom 131 (100 males and 31 females) were white, and 41,493 (21,070 males and 20,423 females) were coloured. The peninsula is bounded on the N. by the Sierra Leone river, and on the S. by Calmont Creek and Yawry Bay. Along the coast stretches a belt of rich low lying land, and elsewhere in the colony there are fertile tracts; but the interior is a mass of rugged mountains, with a generally barren soil. The climate is humid and unhealthy—the wet season, lasting from May to November, being specially pestilential. Tropical fruits and plants grow luxuriantly in the more favourable regions, and coffee, sugar, indigo, and cotton, have been introduced by the British. In 1860, the exports amounted to £304,394, the chief articles being gold, cotton-goods, ground-nuts, palm-oil, hides, palm-nuts, manufactured tobacco, and timber. In the same year, the imports amounted to £172,726, and the chief articles were cotton-goods (nearly one-half of the whole value), gunpowder, ready-made apparel, hardware, haberdashery, and rum. In 1860, there were 71 schools, attended by 11,016 children. The revenue amounted to £33,734, and the expenditure to £31,136. In 1860, 773 vessels, of 101,526 tons, entered and cleared the ports. The colony is divided into numerous parishes, ministered to by about 20 clergymen, and superintended by the bishop of Sierra Leone. The government rests in the hands of a crown-appointed governor, assisted by a council, of a very limited number of members.

The settlement of S. L. was established in 1787, when 470 destitute negroes were removed to it from London by a body of philanthropists; and 1196 negroes were sent to it from Nova Scotia—the climate of which had proved too severe for them—in 1790. The population was also increased by other bands of people of colour; and after the abolition of the slave trade in 1807, the slaves captured by British cruisers have been put ashore, and settled here. In 1820, the settlement contained only 12,000 inhabitants, or less than a third of its present population.

SIERRA MA'DRÉ, a name given to central portions of the great chain of Cordilleras or Rocky Mountains, in Mexico, from lat. 19° to 25° N., and in New Mexico, to the great western range, from lat. 34° to 38° N. These ranges, but partially

explored, contain some of the richest silver mines in the world.

SIERRA MORE'NA, a mountain-range in Spain, on the southern border of New Castile, and between the modern provinces of Ciudad Real and Jaen. It separates the upper portions of the basins of the Guadiana on the north, and of the Guadalquivir on the south, and rises in its highest point to 5500 feet above the sea. It is frequently mentioned in *Don Quixote*, and is the scene of many of the incidents therein described.

SIERRA NEVA'DA (*Snowy Range*), a mountain-range of Spain in Andalusia, extending east from Padul, 12 miles south of Granada, to the frontiers of the modern province of Almeria, is 60 miles in length, from 20 to 30 miles in breadth, and covers an area of upwards of 1000 square miles. It is continued on the north-east by the Sierra de la Filabras, and forms a portion of the watershed between the streams that flow into the Mediterranean and those that flow into the Atlantic. The peak of Mulhacen reaches a height of 11,678 feet, and is the highest summit not only of the Spanish Peninsula, but of the whole of Europe west of the Alps. The peak of Veleta is 11,387 feet high. The range receives its name from the perpetual snow which covers the highest summits. The views from the summits, from which, on the south, may be seen the faint outline of the African coast, on the north, the jagged sierras of the Castiles, can hardly be surpassed in beauty and magnificence by any in Europe.

SIERRA NEVADA, a range of mountains in California, forming a portion of its eastern boundary, is the source of a multitude of rivers, which swell the Sacramento and San Joaquin. The range extends from north-west to south-east 450 miles, and is united to the coast-range, which runs parallel with the Pacific, by Mount San Bernardino. Among the higher peaks of the S. N. are Saddle Peak, 7200 feet high; Table Mountain, 8000 feet; and the Buttes, 9000 feet. Here are immense deposits of gold quartz, with steam and water power crushing-mills; deep tunnels and mines, increasing with their depth their yearly product.

SIEYÈS, Emmanuel Joseph, Comte, who, as the Abbé S., prominently figures in the history of the French Revolution, was born at Fréjus, May 3, 1748. He was educated at the university of Paris with a view to his entering the church; and on the completion of his studies, he obtained the appointment at Treguier, in Bretagne (1775), whence, in 1780, he was transferred to the cathedral of Chartres, of the diocese of which he became chancellor and vicar-general. He had early imbibed the extreme liberal opinions on all matters social and political which were preparing the French Revolution; and when, in 1789, the States-general were summoned, he issued his famous pamphlet, entitled *Qu'est-ce que le Tiers Etat?* This work, which claimed for the people political recognition, naturally enough obtained an immense popularity for its author, and procured his election as one of the deputies for Paris. Mainly through his urgency and influence it was that, on June 16, 1789, the representatives of the people took the decisive step of constituting themselves into an independent body, and became the National Assembly. Of this body he continued for some time to be one of the most prominent and leading figures. In 1791, he was elected to the Legislative Assembly, then convened, as member for the department of Paris. By this time, however, he had sunk somewhat from his first pre-eminence; bolder and fiercer spirits had passed him in the race for power and popularity, and where he had once led, he now reluctantly followed. In the Convention of 1792, to which he was elected as deputy of the department of La Sarthe, he prudently refrained from any active participation in the debates, and on the occasion of the king's trial, he recorded a silent vote. Whilst Robespierre and his party were in power, he consulted his safety by retiring from Paris. When afterwards asked what he had done during the Reign of Terror, he quietly replied: *J'ai vécu* ('I have lived'). On the fall of Robespierre, he returned to his post in the Convention, and resumed his active interest in affairs, becoming a member of the new Committee of Public Safety. He was engaged chiefly in the department of foreign policy, and he went as ambassador to Holland and Berlin successively to negotiate treaties of alliance. He became a member of the Directory in 1799, and among other reactionary measures, he succeeded in closing the celebrated Jacobin Club. Perceiving that a stable government was on no other terms possible, he became anxious to secure the co-operation of some powerful military leader, the more particularly as he was ambitious above all things of giving France a 'constitution' (of which he had drawn up one or several); and on the return of Bonaparte from Egypt, he entered into a league with him, the result of which was the revolution of the 18th Brumaire (November 9, 1799), and the institution of the Consulate, S., Napoleon, and Roger Ducos being the three first consuls. Speedily, however, S. discovered in his new ally his master. As to the distribution of power in the new constitution to be formed, he and Napoleon differed irreconcilably; the man of bayonets was the stronger; his political nostrums never got beyond the paper on which they were written; and finally, in disgust at the subordinate position into which he found himself about to sink, S. threw up his place in the government. As a reward of his services, he received on his retirement a sum of 600,000 francs and the estate of Crosne; afterwards exchanged for the equivalent of a splendid hotel in Paris and the lands of Fainanderie, in the park of Versailles. Also the title of Count was conferred upon him. Subsequently, the presidency of the Senate was offered him, but he declined it, and never afterwards concerned himself in public affairs. Banished at the Restoration, he did not return to France till after the revolution of 1830; and in Paris, on June 20, 1836, he died. During the revolution, S. drew up a good many papers of one kind and another; but he is chiefly remembered for his plan of a new constitution, which, however, is very little known. Mignet's *Histoire de la Révolution* contains a description of it; and under the title of *Théorie Constitutionelle* of S., and *Constitution de l'An VIII.*, M. Boulay (de la Meurthe) published (Par. 1836) from S.'s own *Mémoires inédits* a more detailed account.

SIGHING, The Act of, is nothing more than a very long-drawn inspiration, in which a larger quantity of air than usual is made to enter the lungs. This is continually taking place to a moderate degree, and Dr Carpenter remarks that it particularly occurs when the attention is released, after having been fixed upon an object which has strongly excited it, and which has prevented our feeling the insufficiency of the ordinary movements of respiration. Hence this action is often a simple result of deficient aëration; while in other cases, as is universally known, it is excited by a depressed state of the feelings.

SIGHT, Defects of. Under this head we shall consider such affections of the eyesight as are due to some known or unknown peculiarity of the

optical apparatus (including the optic nerve) not dependent on disease—viz., *short-sight, long-sight, double vision, colour-blindness,* and *night-blindness.*

Short-sight, near-sight, or *myopia* (derived from the Greek words *myo,* I close, *ōps,* the eye), is often popularly confounded with dim or weak sight; but in reality, short-sight applies exclusively to the *range* and not to the *power* of sight, and a short-sighted person may possess the acutest power of vision for near objects. In this affection, the rays which ought to come to a focus upon the retina converge to a point more or less in front of it. The cause of this defect probably differs in different persons. It may arise from over-convexity of the cornea or the lens, from undue density or abundance of the humours of the eye, from elongation of the globe in its antero-posterior diameter, or from an imperfect power of the eye to adjust itself to objects at various distances. The distance at which objects are perceived most distinctly by the perfectly normal eye ranges from 16 to 20 inches; an eye which cannot perceive objects distinctly beyond 10 inches may fairly be regarded as short-sighted; and in extreme cases, the point of distinct vision may be three, two, or even only one inch from the eye. Short-sight is frequently hereditary in families. As a general rule, the inhabitants of towns are much more liable to it than persons living in the country, and students and literary men are the most liable of all. While in the Foot-guards, consisting of nearly 10,000 men, 'not half-a-dozen men have been discharged, nor have a dozen recruits been rejected on account of this imperfection, in a space of 20 years, in one college at Oxford no less than 32 short-sighted men (or *myopes,* as they are termed by some oculists) were met with out of 127' (Donders, *On the Accommodation and Refraction of the Eye,* London, 1864, p. 342). The frequency of this affection in the cultivated ranks points directly to its principal cause—tension of the eyes for near objects. The myopia depending, as Donders believes, upon prolongation of the visual axis, this eminent physiologist inquires: 'How is this prolongation to be explained? Three factors may here come under observation: 1. Pressure of the muscles on the eyeball in strong convergence of the visual axes; 2. Increased pressure of the fluids resulting from accumulation of blood in the eyes in the stooping position; 3. Congestive processes in the base of the eye, which, leading to softening, give rise to extension of the membranes. That in increased pressure, the extension occurs principally at the posterior pole, is explained by the want of support from the muscles of the eye at that part. Now, in connection with the causes mentioned, the injurious effect of fine work is, by imperfect illumination, still more increased; for thus it is rendered necessary that the work be brought closer to the eyes, and that the stooping position of the head, particularly in reading and writing, is also increased. Hence it is that in schools where, by bad light, the pupils read bad print in the evening, or write with pale ink, the foundation of myopia is mainly laid. On the contrary, in watchmakers, although they sit the whole day with a magnifying-glass in one eye, we observe no development of myopia, undoubtedly because they fix their work only with one eye, and therefore converge but little, and because they usually avoid a very stooping position.'—*Op. cit.,* pp. 343, 344.

So far from short-sightedness improving in advanced life, as is popularly believed, it is too frequently a progressive affection; and every progressive myopia is threatening with respect to the future. 'If,' says Donders, 'it continues progressive, the eye will soon, with troublesome symptoms, become less available, and not unfrequently, at the age of 50 or 60, if not much earlier, the power of vision is irrevocably lost, whether through separation of the retina from the choroid, from effusion of blood, or from atrophy and degeneration of the yellow spot.'

In the treatment of myopia the principal objects are: 1. To prevent its further development and the occurrence of secondary disturbances; and 2. By means of suitable glasses, to render the use of the myopic eye easier and safer.

1. To effect, if possible, the first object, the patient must look much at a distance, but as we cannot absolutely forbid his looking at near objects, spectacles must be provided which render vision distinct at from 16 to 18 inches. Moreover, it is desirable that at intervals of a half hour work should be discontinued for a couple of minutes, and no working in a stooping position should be permitted. The patient should read with the book in the hand, and in writing should use a high and sloping desk.

2. The optical remedy for short-sight obviously consists in concave glasses of a focus suited to the individual case. At first sight, it might be supposed that glasses with a concavity exactly sufficient to neutralise the defect in the eye, would always suffice; and when the glasses are used exclusively for distant vision (for example, in the double eye-glass, which is only at intervals held before the eye), or when the affection is slight, and the eye is otherwise healthy, perfect neutralisation is admissible; but so many circumstances forbid the complete neutralisation of the myopia, that an oculist of reputation should always, if possible, be consulted as to the choice of spectacles. Glasses, if injudiciously selected, usually aggravate the evil they are intended to remedy; and in connection with this subject, we must warn our readers against the prevalent habit of employing a single eye-glass; it is most prejudicial to the eye which is left unemployed, and often leads to its permanent injury.

Long-sight and *presbyopia* (derived from the Greek words *presbys,* an aged person, and *ōps,* the eye), are usually considered by English writers as synonymous terms. Donders, who is now universally accepted as the highest authority on this department of eye-affections, maintains that 'the term presbyopia is to be restricted to the condition in which, as the result of the increase of years, the range of accommodation is diminished, and the vision of near objects is interfered with.' As from youth up to extreme old age, the vision of near objects becomes progressively more and more difficult, it is impossible to fix any limit as the commencement of presbyopia. In practice, however, a word is required which indicates the condition in which the eye, at an advanced period of life, and sometimes sooner, requires convex spectacles for distinct near vision, as, for example, for reading, and this word is *presbyopia.* In this state, the nearest point of distinct binocular vision is found to lie about 8 inches (or double the ordinary distance) from the eye, and at this point Donders arbitrarily places the commencement of presbyopia. This condition, which is as natural a concomitant of advanced life as gray hairs or wrinkles, is occasionally met with in young persons. In these cases, it generally arises from intestinal irritation, and may be a precursor of amaurosis; hence such cases should be carefully watched. In ordinary presbyopia, the defect is at once remedied by the use of glasses of low convex power, as of thirty or twenty-four inches focus, which should, however, only be worn during reading and writing, and not constantly. Although the improper use of convex glasses is not by any means so dangerous as the inconsiderate use of concave glasses, the advice of a

good oculist regarding the choice of spectacles is well worth his fee.

Double vision, or *diplopia*, is of two kinds. It may arise from a want of harmony in the movements of the two eyes, the vision of each eye singly being perfect; or there may be double vision with one eye only. The first form may occur (1) in cases of squinting, or (2) in cases of paralysis of one or more of the muscles of the orbit. In cases of Squinting (q. v.), the vision of the most distorted eye is almost always imperfect; and it is well known that impressions on the two retinæ are similar in kind but dissimilar in form. The mind takes cognizance only of the former; so that a person with a bad squint sees objects with the sound eye only. But if the sight of both eyes is nearly equal, as often is the case when the squint is not very well marked, double vision results whenever both eyes are employed together, in consequence of images of nearly equal intensity falling on non-corresponding parts of the two retinæ. This variety of double vision, although annoying, is perfectly harmless. When double vision arises from muscular paralysis, disease of the brain of a serious nature is to be apprehended, although the affection sometimes appears to arise from exposure to cold. The second form of double vision—viz., double vision with a single eye, is a much more rare affection than the preceding one, and depends upon some irregular refraction of the cornea or lens.

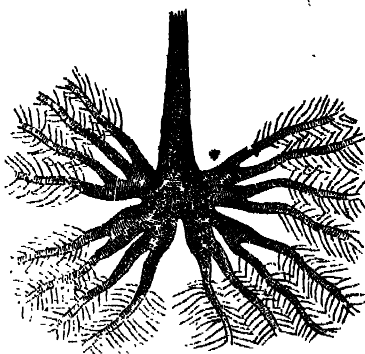
Colour-blindness is noticed under its own name.

Night-blindness, or *hemeralopia* (from the Greek, signifying 'day-sight'), is a peculiar form of intermittent blindness, the subjects of which see perfectly with an ordinary light, but become entirely and almost instantaneously blind as soon as twilight commences. It is seldom met with in this country except among sailors just returned from tropical regions. It is frequent among the natives of some parts of India, who attribute it, as our own sailors do, to sleeping exposed to the moonbeams. The most probable cause of the affection is, however, exhaustion of the power of the retina from over-excitement from excessive light, so that this organ is rendered incapable of appreciating the weaker stimulating action of twilight or moonlight. All that suggests itself in the way of treatment is to protect the eyes from strong light during the day, and to prescribe quinine and a nourishing mixed diet.

Snow-blindness must be regarded as an allied affection to the preceding.

SIGHT OF A GUN. See GUNNERY.

SIGILLA'RIA, a genus of fossil plants which are of importance because of their singular structure, and their remarkable abundance in the coal measures. They seem to have contributed more than any other genus of plants to the formation of coal. The roots of S. are found preserved in the shale which forms the floor of all coal-seams. These roots were originally supposed to be distinct plants, and have received the generic name of Stigmaria. The most feasible notion, and that generally accepted regarding them, was that they were fleshy water-plants, with numerous linear leaves, articulated to the stem by papillæ, which were buried in deep cylindrical hollows in the stem. Brongniart first suspected that they were roots, and Binney placed the question beyond doubt by discovering a specimen in which the trunk of a S. rose from the crown of a Stigmaria. Several observers have subsequently seen these fossils also in actual contact. It is believed that the mud (now converted into shale) in which they grew was very soft, and easily permitted the passage of the large roots, while they gave off all round innumerable large hollow rootlets. The stems of S. are abundant in the coal-beds. They are marked by parallel longitudinal flutings, and regular scars formed by the base of the leaf-stalks, which had fallen off. They are known to have attained a height of 70 feet, and a diameter of 5 feet. The stem rose without branching till near the summit, when it branched several times dichotomously. The proportion of woody matter to cellular tissue in the stem was very small. The



Trunk of Sigillaria rising from the Stigmaria Roots (*E. W. Binney*).

woody fibre is characterised by the abundance of scalariform vessels, similar to those which occur in *Lepidodendron*, and in the recent vascular Cryptogamia. The stem is seldom found preserved so as to exhibit any structure, or even its cylindrical form; it generally occurs as a double layer of coal, shewing on the outer surfaces the scars produced by the bases of the leaf-stalks. The form and arrangement of these scars have been used to distinguish the species, and, indeed, no other materials exist, for hitherto no foliage of any kind has been certainly found connected with the trunks. The restoration of the genus has been consequently quite imaginary. Some, with Brongniart, have supposed that the trunk terminated in a crown of simple leaves, like that of many palms, and that it was a gymnosperm near to the Cycads. Others, with King, consider that the fronds of *Pecopteris nervosa*, which are very abundant in the coal measures, are its foliage, and they would restore it so as to have the appearance of a modern tree-fern. And others, with Binney, consider that its affinities are nearer to *Lepidodendron*, and that some of the numerous fragments which have been referred to this genus may really be the branches of Sigillaria. They would restore it as if it were a huge *Lycopodium*, and refer to it some of those fruits which, under the names of *Lepidostrobus* and *Flemingites*, have been described by Brown, Hooker, and Carruthers.

SIGISMUND, emperor of Germany (1411—1437), was the son of the Emperor Karl IV. He was well educated, and having married Maria of Anjou, on her accession to the throne of Hungary he became chief administrator of that kingdom. The death of his wife in 1392 made him king of Hungary; and at the head of a numerous army of more than 100,000 men, composed of Hungarians, French, Germans, and Poles, he attempted to relieve the Byzantine empire from the fierce Turks, but was terribly defeated at Nicopolis (28th September 1396). On his return to Hungary, he found on the throne a new monarch, Ladislas of Naples, who imprisoned him (1401); but through the good offices of his elder brother, Wenceslas, he was freed,

and obtained the throne (1402), rewarding his elder brother by snatching from him his kingdom of Bohemia, which he retained for some time. In 1411, he was proclaimed emperor, on the death of Rupert. He was present at the Council of Constance, which he had prevailed upon Pope John XXIII. to hold for the purpose of putting an end to the Hussite and other schisms. He contented himself with protesting against the violation of the imperial safe-conduct which was given to Huss, and ultimately consented to his judicial murder, for the purpose, as his apologists say, of conciliating the council, and so settling the disputes concerning the papacy. His succession to the throne of Bohemia, after his brother's death, was opposed by the Hussites, who were now in insurrection; and after a fruitless attempt to conquer them, he confined himself to the defence of Hungary against the Turks, whom he defeated in a great battle near Nissa (1419). For ten years afterwards, he left Germany very much to the guidance of its self-willed petty rulers, who speedily brought the country into such a deplorable state that they were glad to beseech S. to return to the helm of affairs—which he did, but with little good effect. He obtained, by concessions to the Calixtines (q. v.), the crown of Bohemia in 1436; but when he found himself firmly seated on the throne, he gradually withdrew these concessions, which provoked such discontent, that his death, 9th December 1437, alone averted a civil war. S. left one daughter, Elizabeth, who, by her marriage with Albert V. of Austria, brought Hungary and Bohemia to the House of Hapsburg. S. possessed a large intelligence, and remarkable political talents, but these were much neutralised by his impetuosity, indecision, selfishness, and extraordinary avarice; and his well-meaning endeavours after peace and improvement ended in nothing.

SIGISMUND, worthily surnamed the GREAT, king of Poland, was the youngest son of Casimir IV., and was born at Koziénicé, 1467. He was chosen Grand Duke of Lithuania, 1506, and succeeded to the kingdom of Poland on 8th December of the same year. The affairs of Poland and Lithuania were at that time in a sad condition; the southern portions of the country reduced almost to a desert by the ravages of the Tartars, while the east was continually in dread of the Russians, who had become an independent, united, and powerful monarchy. The Russians invaded Lithuania, and conquered some provinces, but S. gained a brilliant victory over them at Orsza on the Dnieper (14th July 1508). Bogdan, Prince of Moldavia and Walachia, now invaded the southern provinces, as that semi-barbarous race were accustomed to do without let or hindrance; but he was so decisively routed on the banks of the Dniester, that he gladly agreed to acknowledge himself a vassal of Poland. Disregarding the suggestions of the pope to head a crusade against the Turks, S. next read the Tartars, through his general, Ostrogski, a very forcible lesson, in 1512, against aggressive practices, which cost them 27,000 men, and assured the tranquillity of his frontier for a long period. His alliance in 1513 with Stephen Zapoli, voyvode of Transylvania, whose daughter, Barbara, he also married, alarmed the Emperor Maximilian, who incited the Russians to resume their aggressions, which that ill-advised nation cheerfully agreed to do; paying dearly for their rashness, for their army of 80,000, which had invaded Lithuania, was met and cut to pieces (8th September 1514) by Ostrogski, with 32,000 men, at Orsza, leaving its standards, cannons, and other arms, 2 generals, 37 princes, 6000 prisoners, and 30,000 dead in the possession of the enemy. Subsequent invasions of Moscovites and Tartars were repelled as before, and a rebellion of the Walachs was punished by numerous defeats, chief of which was that of Obertyn (1531). The insolence of the Teutonic Order, who had invaded Polish Prussia, was effectually chastised by S., who defeated their Grand Master Albert, his own nephew, in two great battles, in the latter of which the knights were assisted by the Danes (1520). In 1525, he agreed to confer on Albert the title of Duke of Prussia (now known as East Prussia), on condition of fealty and homage. The dukes of Prussia continued as vassals of the Polish crown till 1657. In 1526, S. alone of the monarchs of Christendom lent aid to Hungary against the formidable array of Solyman the Magnificent, and a numerous force of Polish cavaliers fought bravely on the fatal field of Mohacz (1526). The only other important event of S.'s reign was the introduction and extension of Lutheranism in Poland, a change which S. did nothing to prevent, only taking precautions, and sometimes severe ones, against its affecting the civil and political condition of the country. It is told of him that, when John Eck exhorted him to take severe measures with the Lutherans, whom he compared to goats among the sheep ('the faithful Catholics'), S. replied that he was desirous of being 'king of goats as well as king of sheep.' After a long and glorious reign, S. died at Cracow, 1st April 1548, leaving the character of a just, wise, and magnanimous prince, who had restored to his country its ancient prosperity, and had raised it from the very feet of its enemies to a worthy superiority over them.

SIGNALS are the means of transmitting intelligence to a greater or less distance by the agency of sight or hearing. Incomparably the most powerful medium yet known for this purpose is the electric current. See TELEGRAPH. Sound signals have obviously but a short circuit. The electric current requires fixed apparatus establishing an actual communication between the two points; and is therefore inapplicable to the ordinary cases of ships interchanging signals with each other or with the shore; and, except under unusual circumstances, it would not apply to armies manœuvring in the field. For these purposes, so far as present knowledge extends, signals by sight or sound must always be practically the resort.

The ancients seem to have elaborated a fair system of night-signals by torches for military purposes; but in naval affairs the ships sailed so close together, that orders could be communicated by word of mouth, while the turning of a shield from right to left sufficed as sailing directions to the several lines. In modern times, signalling between ships has become indispensable; but there is probably no department of practical science in which progress has been slower, and every so-called system of signals has been distinctly without any system whatever. In the time of James II., a signal could only be expressed by flags, in confusing number, hung in different parts of the vessel. By the commencement of the present century, thanks to Sir Home Popham and other inventors, the system had been adopted of hanging a number of flags under one another, each symbol or combination having an arbitrary conventional meaning attached to it. Alterations in the specific flags have been made from time to time, but essentially this is the system now in use. The flags are either square, triangular of the same length, or pendants which are pointed and longer. These are of black, white, red, blue, and yellow (in the Austrian service alone green is added) in mass or in combination. Specimens of the flags in use in the present naval

code are shewn in fig. 1. The signalmen find, however, that at a distance blue, red, and black are not readily distinguishable, nor yellow from white.

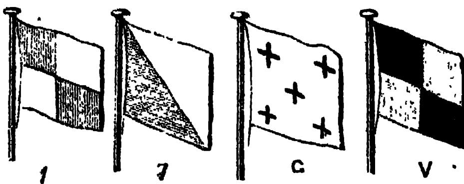


Fig. 1.

It has consequently been the recent tendency, and apparently most justly, to reduce all the signs to black and white, singly or in combination, trusting to shape for different signals.

There are, however, disadvantages attending flags. In a still day, they are difficult to read; or the wind may so blow that they are only seen end on. At sea, the motion of a ship will generally neutralise these drawbacks; but the case is otherwise on shore, and it may consequently occur that the ship can communicate to the land, but cannot get a reply. To obviate this, signals representing solid figures are sometimes employed. To fulfil their conditions, they must appear the same in whatever lateral direction seen. But this limits the shapes to cylinders, cones, and the sphere, or combinations of those figures; and as the total number of distinguishable signs is reduced, signalling becomes reduced from the word-signal to the telegraph. This distinction should be clearly understood, as much is involved in it. A word-signal, as in the present system, is where the whole word or message is sent up at once, and flies simultaneously; a telegraph signal is one in which the letters composing the word or numbers representing the signal are shewn separately, and each is removed before another is shewn. At sea, the word-system is best, for it involves no act of memory; and memory, even from signal to signal, is found difficult by signalmen in the turmoil of perhaps storm or fighting. On the other hand, the telegraph system involves far simpler apparatus, and the changes can be effected more rapidly. As regards the actual time required for a message, the word-system has the advantage in a message short enough for the whole to be shewn at one time; but otherwise the difference is not material. If all advantages be balanced, it is probable that the telegraph system will eventually supersede the other entirely. Whether the word or the telegraph system be practised, another question is, whether to spell each word, or to use numerals and a code. Under the latter principle, about 14,000 of the words and sentences most commonly sent are arranged for easy reference in the signal-book. With the addition of 1 or 2 repeating symbols, the 9 numerals and 0 give combinations 4 together to this number. A combination of figures is arbitrarily assigned to each expression; and the expression is communicated by representing those figures in their proper order. With the book of reference at hand, and intelligent signalmen, there can be no doubt of the superior rapidity of the 'code.' A code has also this further advantage, that the signals representing things and not words, it can be made international, the same symbols representing the same idea in every language. It is then only necessary for universal signalling that each nation should concur in the meaning to be attached to the several signs. Many gentlemen of ability have devoted their attention of late years to the simplification of signals; among whom conspicuous positions must be assigned to Colonel Grant, Captain Bolton, Mr Redl, and Lieutenant Colomb, R.N. Their principal object has been so to simplify the telegraph system that signals may be made with any apparatus, or without apparatus at all. To accomplish this, they have, to a great extent, abjured colour, and resorted to form and motion. Among the form telegraphs there is the principle of the old Semaphore (q. v.), in which each letter or number is shewn by the position of two arms, as in fig. 2. The arms are heavy, and involve mechanism; besides which they are not always clear on a ship in motion beyond a short distance. Very superior in visibility and simplicity is Redl's System of Cones. This consists of 4 cones fixed to a mast. The cones are collapsable, and are formed in a similar manner to umbrellas. Their usual condition is shut, and they can only be held open while a rope attached to each is pulled. With cones of 3 feet base, signalling is rapid and clear up to 5 miles, and the mast can be inserted at any place. The system is very simple: each cone represents a number, 1, 2, 3, or 4; then 1 and 4 shewn represent 5; 2 and 4, 6; and so on, as in fig. 3. This very elegant system can be applied in military

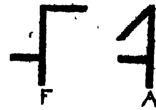


Fig. 2.—Semaphore System.

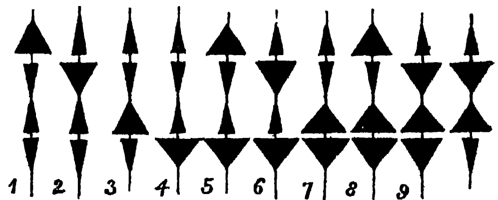


Fig. 3.—Cone System.

or naval operations. But its chief beauty is, that a person understanding it can make the same signals without the cones; for example: if a black flag represent an open cone, and a white flag a shut cone, a ship with 4 black and 3 white flags can make every signal. Again, the arm raised horizontally may represent the open cone; against the body, the shut cone; then two men standing on a cliff are as good as any signal-post, see fig 4. Or if one person

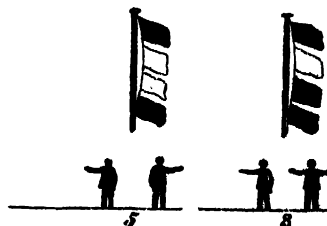


Fig. 4.

only be present, he may represent an open cone by raising his arm with a handkerchief extended, and a shut cone by his arm without the handkerchief. He has only then to raise his arm four times in quick succession, with or without the handkerchief, to make the required signal. We have thus arrived at a universal system of the utmost simplicity, which in war, and especially during invasion, might be of inestimable benefit to the nation. The code of signals cannot be too generally diffused by the government, in order that every man among the public

may become an amateur signalman on emergency. A secret code, in which the same numbers have different significations, could always be maintained for state purposes.

It only remains to apply the same system to night-signals. The old naval principle has been to hang dingy lanterns in various shapes—triangles, squares, crosses, &c. Besides requiring large bases to be at all visible, this has been found from the motion of a ship to be nearly useless. Redl's system has been applied by hanging four lanterns in a vertical line to represent the cones, and obscuring those which corresponded to shut cones. An improvement was found in introducing a red or green light in the middle, to shew the relative position of the four. The best night-signals are, however, flashing lights, as introduced by Captain Bolton, and more elaborately by Lieutenant Colomb, and adopted in the navy. This consists of a bright light, covered by a shade, which shade, by mechanism, can be lifted for any given time, exposing the light meanwhile. A flash of about half a second's duration is negative: a line of 1½ seconds, positive. Four exhibitions of the light then represent a symbol as in Redl's cones. If the same nomenclature be adopted we should signal as in fig. 5. It will be seen at once that this system produces results similar to Morse's Electric Telegraph. If the distance be

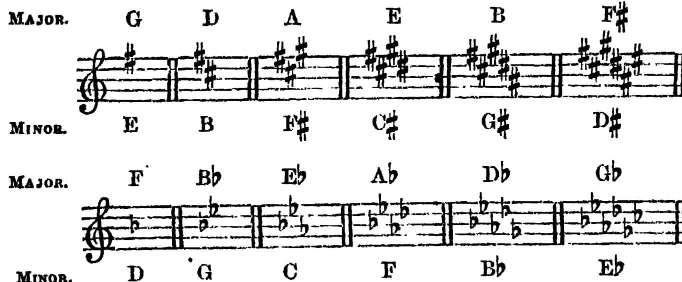


Fig. 5.

within a mile or so, and the weather still, a bugle will answer equally well, long and short notes representing the positive and negative cones.

The fundamental principle of the foregoing system of universal telegraphy, applicable by night or by day, by sight or by sound, is to employ two signals only—one positive and one negative—and to regulate their exhibition by periods of time.

SI'GNATURE, in Music. In writing music in any key with sharps or flats, the sharps and flats belonging to the key, instead of being prefixed to each note as required, are placed together immediately after the clef on the degrees of the staff to which they belong; and this collection of sharps or flats is called the signature. The signatures of the several keys generally in use are as follows:



The minor keys take the same signature with the major keys a third above them.

When a new key is introduced in the middle of a piece of music, the signature of the former key must be contradicted, and that of the new one appended. Thus a transition from the key of D major to that of D minor, is indicated thus: ; from B major to B minor: ; the sharps which are to continue being, in this last case, for distinctness' sake, appended in addition to the contradiction of those that are to be discarded. A transition to another key, which is not to continue for any length of time, is seldom indicated by a change of signature; but the sharp, flat, or natural sign is appended to any note as required, that sign affecting all the following notes of the same letter in the measure in which it occurs, unless contradicted. A sharp, flat, or natural thus introduced is called an accidental. Two accidentals are required in the ascending scale of every minor key, to sharpen the sixth and seventh of the tonic.

Besides the signature of the key, a signature of time precedes every musical composition. It consists of two figures placed over one another as a fraction, the denominator 2, 4, 8, or 16 standing for minims, crotchets, quavers, or semiquavers (i. e., halves, fourths, &c. of a semibreve), while the numerator points out how many of these fractional parts of a semibreve are contained in each measure. Thus, $\frac{2}{4}$ indicates that there are two crotchets, and $\frac{3}{8}$ three quavers, in the measure. When there are four crotchets (or a semibreve) in the measure, it is usual to write C instead of $\frac{4}{4}$.

SIGNATURE, in Printing, denotes the letters which are placed at the bottom of the first page of each sheet of a book, to facilitate the arrangement of the several sheets in the volume. The letters employed are those of the alphabet, with the exception of J, V, and W, three letters which have been invented since the use of signatures was introduced. See ALPHABET. As the first sheet of a work, containing the title-page, dedication, preface, &c., is generally printed last, the letter A is reserved (along with small letters, *a*, *b*, &c., should there be more sheets of introductory matter) for this, and the signatures commence with B; after reaching Z, they commence again at the beginning of the alphabet, the letter being doubled for the sake of distinction, as AA, or A*a*, or more frequently 2A. Should the alphabet again be exhausted, 3A, 3B, &c., are next employed, and so on. This is the method employed in Britain; in France and Italy, figures are generally used. Signatures (as B2, B3, &c.) are also placed on certain pages of the same sheet, as a further direction to the bookbinder.

SIGNET, in England, one of the seals for the authentication of royal grants. Prior to 1848, all letters-patent and other documents which had to

pass the Privy Seal, required first to have the signet affixed, and passed from the Signet-office to the office of the Privy Seal in the form of signet bills, verified by the signet-seal and superscription and the signature of the Clerk of the Signet. By act 11 and 12 Vict. c. 82, however, warrants under the royal sign-manual, countersigned by one of the principal secretaries of state, have been made *per se* sufficient authority for the Privy Seal to be affixed, and the Signet-office has been abolished. The signet in Scotland is a seal which seems to have been originally intended to authenticate royal warrants connected with the administration of justice. The principal class of agents or attorneys in Scotland are called Writers to the Signet, it is said from their having been originally clerks in the office of the Secretary of State, by whom writs passing the signet were prepared. See WRITERS TO THE SIGNET.

SIGNING, SEALING, and DELIVERY of a deed, in English Law, is the mode of executing a deed. The main acts are, however, the sealing and delivery, for signature is not absolutely essential—at least in some kinds of deeds known to English law. The use of the seal is an ancient form of authenticating deeds, still kept up in England, though long superseded in Scotland by simple subscription. In practice, a wafer or seal is attached to the end of the English deed, and the party who executes it must, after signature, put his finger on the seal, and say: 'I deliver this as my act and deed,' at the same time handing the deed to the person who is to have the custody thereof.

SIGN-MANUAL, ROYAL, the subscription of the sovereign, which must be adhibited to all writs which have to pass the Privy Seal or Great Seal. When attached to a grant or warrant, it must be countersigned by one of the principal secretaries of state, or by the Lords of the Treasury. The sign-manual, in practice, consists but of the initial of the sovereign's name, with the letter R added, for *Rex* or *Regina*.

SIGOURNEY, MRS LYDIA HUNTLEY (Huntley being her maiden name), American authoress and poet, was born at Norwich, Connecticut, in 1791. She was, like most young ladies of ability in New England at that period, early engaged in teaching, and much of her early writings consist of tales, essays, instructive letters, and poems, for her pupils and the young. Her first published work was a volume of poems in 1815. In 1819, she was married to Mr Charles Sigourney, a merchant of Hartford. In 1822, she published a descriptive poem on the *Traits of the Aborigines of America;* and in 1824, a *Sketch of Connecticut Forty Years Since.* These were followed by *Pocahontas and other Poems, Lays of the Heart, Tales in Prose and Verse,* &c. In 1840, Mrs S. visited Europe, and on her return, with a freedom common to American authors, wrote her *Pleasant Memories of Pleasant Lands.* She compiled amusing and instructive books for the young, and was a constant contributor to magazines and other periodicals of poems, whose subjects, style, and sentiment gave her the designation of 'the American Hemans.' She died at Hartford, June 1865.

SIHU'N. See JAXARTES.

SIKHS. The term Sikh, a corruption of the Sanscrit *s'ishya,* signifying 'disciple,' is applied to a community of which the Punjab, in Northern India, constitutes, substantially, the confines. Less commonly, even among themselves, the members of this community are also known as Sinhs (vulgarly Singhs), that is, 'lions,' a title given them by Govind, the last and most influential of their hierarchs. Every name of a Sikh male now terminates with the word Sinh.

Originally a body of mere religionists, the Sikhs, what from the energy which they developed under repression, and the inducements to join them which they offered as proselytisers, grew, by degrees, in strength and numbers, and ended in a formidable nationality. Their originator, Nânak, was born in 1469, in the vicinity of Lahore, and died in 1539, not far from the place of his nativity. To him succeeded, in turn, nine pontiffs, each of whom, like himself, is popularly denominated guru, or 'teacher.' These were Angad, Amardâs, Râmdâs, Arjunmall, Hargovind, Harrây, Harkrishna, Teghbahâdar, and, finally, Govind.

The aim of Nânak was pointedly humanitarian, and designed to combine Hindus and Mohammedans, at the cost of what he held to be only unimportant compromise, into one harmonious brotherhood. Sufficient proof of the comprehensive character of his scheme is afforded by the circumstance that he accepted concurrently the incarnations of Neo-Brahmanism and the mission of the Arabian prophet. His three immediate successors, while zealously protecting the interests of the infant sect, avoided secular pursuits, and held themselves aloof from political complications. Arjunmall, however, not content with signalising himself as compiler of the *Âdigranth,* and as founder of Amritsar, the holy city of the S., engaged with ardour in trade, and rendered himself conspicuous as a partisan of the rebellious Prince Khusrû, son of Jahângîr. Hargovind, who came after Arjunmall, called the S. to arms, led them in person to battle, and, though he remitted nothing of his assiduity as a guru, became an active and useful, though sometimes refractory, adherent of the Great Moghul, against whom his predecessor had plotted. Harrây subsequently espoused the part of Dârâ Shukoh, when contending with his brothers for the throne of India. Harkrishna, son of Harrây, died a child, and was only nominally a guru. Teghbahâdar, after a career of turbulence, was executed as a rebel, by command of Aurangzeb, at Delhi. However deficient in the qualifications demanded for spiritual leadership, it can scarcely be doubted that he contributed, to an important degree, in preparing for the complete change of Sikhism which was effected by his son, Govind. The chief motive that instigated Govind, the tenth of the 'teachers,' to bring about this change was, with some probability, a desire to avenge the ignominious death of his father. He resolved to combat the Mohammedan power and, in deviation from the principles enunciated by Nânak, the Mohammedan religion as well. But Hinduism, with its social restrictions of caste, its fantastic fictions, and its irrational idolatry, likewise fell under his ban. God, he inculcated, is not to be found save in humility and sincerity. In what measure he was a man of thought is evinced by his legacy to his co-religionists, the second volume of the Sikh scriptures. A Sikh, it is therein taught, is to worship one God, to eschew superstition, and to practise strict morality, but equally is to live by the sword. The purport of this last injunction is unmistakable. Govind was assassinated, while in the imperial service, in 1708, on the banks of the Godâvarî. He died, it is true, without beholding the fulfilment of the purpose for which he had striven; but he had, nevertheless, succeeded in stirring his followers to an ambition for political independence—an idea which was ultimately transformed into a reality. His successor, but only as a temporal leader, Banda, suffered a cruel death. He did but little to advantage his sect; and his memory is not held in reverence.

With the decline of the Moghul Empire, the might of the S., in spite of their intermittent reverses, steadily increased, until, in 1764, they convened a general assembly, formally assumed the character of a substantive nation, and issued coin from which the name of the emperor was omitted. Their commonwealth was still denominated, as it had been by Govind, Khâlsa; and the component states of the federation, ordinarily said to have been twelve in number, were thenceforward distinguished as Misls. Foremost in influence among these states was that of Sukarchakiyâ, the chieftain of which was Mahâ Sinh, for whose son, the famous Ranjit Sinh (Runjeet-Singh, q. v.), it was reserved to consolidate the Misls into a unity subject to his own undivided control. The virtual headship of Ranjit Sinh dates from the year 1805, though it was not until 1838 that he attained the zenith of his ascendency. He died in the year following, at the age of 59. During 1845 and 1846, the S. ceased to exist as a nation; and their country has since been ruled by the English. Yet every loyal Sikh is still confident that his people is suffering but a transitory depression, and that it is destined to retrieve, and even to surpass, its bygone glory. In the meantime, the reputed son of a wife or concubine of Ranjit Sinh, Dilîp Sinh, is a pensioner of the British government, has professed Christianity, and has taken up his abode in England.

Ethnologically considered, the S. are, in large proportion, of Jât origin; the Jâts, whom some take to be one with the classical Getæ, being a tribe extensively diffused over the north of India. But other Hindus have helped to swell their ranks, and also not a few Mohammedans. The ten gurus are accounted Kshatriyas, or of the second Brahmanical caste, the martial. The descendants of these several races, from intermarriage and other causes, cannot, however, now be discriminated; and there is no division of the multiform population of India that strikes more than the S., as respects physical uniformity. For symmetry and comeliness, and, it may be added, for courage and powers of endurance, the Lions of the Punjab are altogether remarkable.

Nânak's was, undoubtedly, by far the most successful of the repeated attempts which have been made to fuse together the incompatible dogmas of Hinduism and Islamism. None of the authors of these attempts seem, indeed, to have been acquainted with other than the mere surface of the two religions which they would have blended into one. With the Mohammedan, the existence of the Deity as a pure spirit, and his creatorship of the world, are fundamental postulates. On the other hand, the radical doctrine of the Hindu is pantheism, agreeably to which the universe, alternatively God, is a single eternal substance, under the twofold aspect of spirit and matter. These sets of first principles, which Nânak and his fellow-reformers could never have clearly apprehended, are palpably impossible of reconciliation. Without rejecting all that is distinctive of his creed, no Hindu can assent to the theology of Islam; and, conversely, every intelligent follower of the Arabian prophet must be aware that the monism and the metempsychosis of Brahmanism are utterly antagonistic to the leading positions of his own faith. Govind, as we have seen, openly repudiated the notion of amalgamating Hinduism and Mohammedanism. But a critical acquaintance with his real views, in their fulness, and of those of Nânak, must remain a matter of conjecture until we possess a detailed translation, executed by some scholar competently versed in Hindu philosophy, of the *Âdigranth* (The Original Record) and the *Daswin Pâtsâhî dâ Granth* (The Record of the Tenth King). These voluminous compositions are metrical throughout, and are chiefly in Hindî and Panjâbî; the former containing, additionally, a little Sanscrit, and the latter, a long chapter in Persian. They are written in the same character as the Sanscrit, the values of the letters being altered, though their forms are retained.

Among the numerous divisions into which Sikhism, as a system of belief and practice, has ramified, two, at least, apart from the great central sect, deserve specification. First are the Udâsîs, professors of indifference to mundane concerns; a sect whose origin is attributed to S'rîchand, a son of Nânak. These recluses, whom Amardâs refused to recognise as genuine S., have, to this day, numerous disciples. The Akâlîs sprang up just after the time of Govind. For extravagance of fanaticism, these Ishmaelites have, it is hoped, no rivals; and the style of their piety is comparable with that of a Thug.

As specimens of the superstitions of the S., it may be noted that, like the Hindus, they look upon the eating of beef as a deadly offence, and that, like the modern followers of Zoroaster, they attach sinfulness to the act of extinguishing a light with the breath. Some illustrations of practical Sikhism may also be gathered even from the few remarks that have been made touching the gurus. It is not irrelevant to add, that Amardâs humanely discountenanced the cremation of widows, and that Arjunmall committed suicide. The morality of ordinary S. is as positively maintained by one class of writers as it is denied by another. Evidence should seem to shew that the agriculturists among them are much on a par, as to correctness of life, with other Indian cultivators of the soil. As to their soldiers, however, it has been observed that they are deeply tainted with those repulsive impurities for which the Persians are so infamous. Though forbidden the use of tobacco, they are under no restriction as concerns indulgence in bhang, opium, and intoxicating drinks; and it would be gross flattery to commend them on the score of sobriety. As regards morality, there is reason to believe that they have greatly degenerated since the days of Govind.

The gross Sikh population has been most variously estimated by different statisticians, some of whom compute it at considerably less than half a million of persons, while others deem a million and a quarter, or even a million and a half, to be not excessive.

For the most satisfactory extant treatment of the subject of this article, the reader is referred to Captain J. D. Cunningham's *History of the Sikhs*. Sir J. Malcolm's *Sketch of the Sikhs; The Asiatic Researches*, vols. i. and xi.; the collective works of Professor H. H. Wilson, vols. i. and ii.; and *The Calcutta Review*, vols. xxxi. and xxxiii., may likewise be consulted with advantage.

SIKH WARS, two brief but desperate contests waged between the British power in India and the Sikhs in 1845—1846, 1848—1849, which resulted in the destruction of the latter as an independent nation. The first had its origin in the dissensions which convulsed the Sikh country after the death of Runjeet Singh (q. v.), and which necessitated the exercise of a wary regard on the part of the Calcutta authorities. At length an army of Sikhs, flushed with their triumph over all lawful authority in their own country, crossed the Sutlej, and extended their ravages over British territory; but their advanced guard was met by Sir Henry Hardinge, the governor-general, at the head of four regiments of infantry and one of dragoons, and routed at Mudki (q. v.) with heavy loss. Three days after, their main body, which had meantime crossed the river, and intrenched itself at Feroze-

Shah (q. v.), was attacked by a larger force of British under Gough and Hardinge, and after a bloody conflict, which lasted two days, also routed. Still undismayed by these reverses, they again intrenched themselves at Sobraon; but a fresh body which had just crossed the Sutlej at Aliwal (q. v.), 19,000 strong, with 68 pieces of cannon, was wholly routed and driven across the river by Sir Harry Smith, at the head of 7000 men, with 32 guns; and their main body was soon after similarly dispersed at Sobraon (q. v.). The British then crossed the river, took Lahore, and restored the authority of the young Maharajah, from whom they took the territory between the Beas and the Sutlej, the treaty confirming this settlement being made at Lahore, 9th March 1846. But the internal disturbances in the kingdom of Lahore soon became as active as before, and induced the Maharajah's prime-minister to put the country under the Company's protection; and a residency with a guard of regular troops was then established in the capital. On April 20, 1848, two British officers were murdered by a Sikh chief, the dewan Moolraj of Multan; and as this was found to be but a premonitory symptom of a general outbreak, a small force of British under Lieutenant Edwardes, aided by a body of Sikhs, under the Rajah of Bhawalpûr, gallantly attacked the army of Moolraj, which, after a desperate conflict of nine hours, they defeated on June 18, and, both sides in the meantime having received reinforcements, again on July 1. Multan was then laid siege to, but the defection of 5000 auxiliary Sikhs under Shere Singh (the son of the Sirdar Chuttur Singh, the governor of Hazara, who had been for some time in revolt, and had driven the British from his district) compelled the British to retreat. For some time, the British authorities in the Punjab were hampered by a want of military force, and though the Maharajah and much of his army still opposed the Sikh rebels, little reliance could be placed upon most of it. Shere Singh now succeeded in raising his army to 40,000, but was defeated by Lord Gough at Ramnugger (November 22). The inconsiderate haste of Gough at Chillianwalla (January 13) nearly lost him that great battle, which was saved only by the extreme valour of his soldiers; but amends for this fault was made at Gujerat (q. v.), where the power of Shere Singh and his allies was completely broken. Meanwhile, the fortress of Multan had, after a protracted bombardment, been captured; and the Company, seeing no other mode of protecting their territories from annoyance by these warlike fanatics, annexed the Punjab, March 29, 1849, thus terminating the existence of the Sikhs as an independent nation.

SI-KIA'NG, or WESTERN RIVER, a river at the southern extremity of China Proper. It has lately been ascertained by our surveyors to be navigable for vessels not drawing more than 16 feet of water for about 100 miles from its mouth. The S. is remarkable for the purity and clearness of its waters. It is at present chiefly useful in conveying the sugar-cane that grows in its vicinity, as well as rafts of timber from the forests of Kwangse, to the markets of Canton.

SI'KKIM, a small protected state in the north-east of India, bounded on the W. by Nepaul, and on the S.-E. by Bhotan. Area, 1670 sq m.; pop. 61,766.

SILENÉ, a genus of plants of the natural order *Caryophyllaceæ;* with a tubular 5-toothed calyx; five notched or bifid petals, which terminate in a narrow claw at the base, spring from the stalk of the germen, and have each an appendage forming a *Corona* (q. v.) in the mouth of the corolla; ten stamens; three styles; the capsule 3-celled, 6-toothed, many-seeded. The species are numerous, mostly natives of the temperate parts of the northern hemisphere, annual and perennial plants; nine or ten of them natives of Britain, and others frequent in flower-gardens.—One of the most common British species is the BLADDER CAMPION (*S. inflata*), a perennial, which grows in cornfields and dry pastures, and near the sea-shore, has a branched stem fully a foot high; ovate-lanceolate bluish-green leaves, panicles of white flowers, and an inflated calyx, with a beautiful network of veins. The young shoots are sometimes used like asparagus, and have a peculiar but agreeable flavour, somewhat resembling that of peas. They are best when most blanched. The cultivation of this plant was long ago strongly recommended, but it has not obtained a place among garden plants.—The MOSS CAMPION (*S. acaulis*) is a pretty little plant, with beautiful purple flowers growing in patches so as to form a kind of turf, one of the finest ornaments of the higher mountains of Scotland, and found also in Cumberland and Wales.—Many species, some of them British, are popularly called CATCHFLY, from their viscidity, as *S. Anglica*, a species found in sandy and gravelly fields in many parts of Britain.

SILE'NUS, son of Pan and Gæa (the Earth), is generally represented as the chief of the Sileni or older Satyrs (q. v.), and the inseparable companion of Bacchus, with whom he took part in the contest against the Gigantes, slaying Enceladus. In most respects, he seems to have resembled the other satyrs, and to have borne a strong likeness to Sir J. Falstaff, being in addition noted for his wisdom and his power of prophecy. S. had a temple at Elis.

SILE'SIA, a province of the kingdom of Prussia, included in the limits of the Germanic Confederation, lies south of the provinces of Brandenburg and Posen, and is bounded on the E. by the Polish provinces of Russia and Austria, and on the S. and W. by the Austro-Germanic provinces, and the kingdom of Saxony. It is divided into three governments: *Liegnitz*, in the west; *Breslau*, in the east, and *Oppeln*, in the south; and these, again, are subdivided into circles. Total area, 15,547 English sq. m., with a pop. (1861) of 3,390,695, of whom 1,674,724 are Catholics, 1,670,317 Protestants, and 41,100 Jews. Of the population, ¼th speak Polish, more than 90,000 employ other Slavic dialects, and the rest use the German language. This province, by far the largest and most populous of the Prussian provinces, is crossed from north-east to south-west by a broad strip of mountainous country, which widens out at each extremity; and along the whole eastern boundary, and in the south, are ranges of low hills; in the north-west and centre, the surface is flat and heathy, or sandy, with numerous stagnant pools. S. is almost wholly included in the basin of the Oder (navigable as far south as Ratibor), which flows through it from south-east to north-west, and receives from each side numerous tributaries; but a small portion in the extreme south is drained into the Vistula, which here takes its rise. The soil is altogether fertile and well cultivated, more so, however, in Lower than in Upper S.; and cereals of all kinds, oil-plants, beet, hops, occasionally vines, and above all, flax and hemp, are the crops of the province; but of late years the cultivation of tobacco, and of plants yielding dye-stuffs, has been receiving increased attention. Cattle and sheep, the latter excellent in quality, and partly of pure or mixed merino blood, are reared in the high-lands, the annual produce of wool averaging fully 140,000 cwt. The mines of S. are of great importance; iron, copper, and lead are the chief

products; coal is found in abundance. The manufacture of lace, averaging in annual value £1,500,000, is carried on in the mountainous districts, chiefly around Schweidnitz; and the production of other fabrics, as linen, cotton and woollen goods, paper, iron, leather, glass, and earthenware, is vigorously carried on throughout the province. The Oder, and the great central railway from Berlin and Posen to Vienna, afford ample facilities for commerce. There are a university at Breslau, gymnasia in the principal towns, and a great number of professional and industrial schools.

S. was inhabited at the beginning of the Christian era by the Quadi and Lygii, who, like the other German tribes, advancing westward in the 6th c., were succeeded by Slavic tribes. It formed part of the Slavic kingdom of Moravia, was next joined to Bohemia, and in the beginning of the 10th c. to Poland. In 1163, it was separated from the kingdom of Poland, but was ruled by dukes who were of the royal line of Piast; these dukes, to repeople the country, which had been devastated by the numerous civil wars, encouraged the settlement of German colonies, especially in Lower Silesia. The practice of division and subdivision of territory prevailed so extensively in S., that at one time it had no less than 17 independent dukes, and to save itself from re-incorporation with Poland, it acknowledged the sovereignty of the kings of Bohemia, with which, and with Germany, from the time of the Emperor Karl IV., it was indissolubly connected. In 1537, the Duke of Liegnitz, one of the numerous Silesian princes, entered into an agreement of mutual succession (*Erbverbrüderung*) with the Elector of Brandenburg, on the extinction of either reigning line; and the other ducal lines becoming gradually extinct, their possessions fell to Liegnitz or to Bohemia, or lapsed to the emperor. In 1675, when the last ducal family, that of Liegnitz, failed, his territories of Liegnitz, Brieg, and Wohlau, would have fallen to Prussia, but the emperor of Germany refused to recognise the validity of the agreement of 1537, and took possession of the Liegnitz duke's dominions, as a lapsed fief of Bohemia. The remainder of S. was thus incorporated into the Austrian empire. In 1740, Frederick II. of Prussia, taking advantage of the helpless condition of Maria Theresa of Austria, laid claim, on the strength of the agreement of 1537, to certain portions of S.; and without declaring war, marched into, and took possession of the province, maintaining his hold despite the utmost efforts of Austria in 1740—1742, and 1744—1745, called the *first* and *second* Silesian wars. After the *third* Silesian war, better known as the SEVEN YEARS' WAR (q. v.), it was finally ceded (1763) to Prussia.

SILESIA, AUSTRIAN, a duchy and crownland of the Austrian empire, bounded on the N.-E. by Prussia, and on the S.-W. by Moravia. Area, 1963 sq. m.; pop. (1857) 443,912. It is mountainous in the west, where the Spieglitzer Schneeberge, a summit of the Sudetic chain, rises to the height of 4512 feet. The crownland comprises 1806 sq. m. of level land, of which by far the greater portion is arable or under wood. The climate, though rough, is healthy, and the soil produces good crops of rye, oats, barley, flax, &c. Within the crownland rise the Oder and Vistula. Cattle-breeding and bee-keeping are important branches of industry; 170,000 head of sheep belong to the crownland. Iron, lead, and coal mining are profitably pursued. The manufactures are principally spirits, copper and iron wares, and linen and cotton fabrics.

SI'LEX (Lat. flint), a generic name given by some mineralogists to all those minerals of which silica is the principal ingredient. See QUARTZ.

SI'LHOUETTE, the name given to a profile or shadow-outline of the human figure, filled in of a dark colour, the shadows and extreme depths being sometimes indicated by the heightening effect of gum or some other shining material. This species of design was known among the ancients, and was by them carried to a high degree of perfection, as the monochromes on Etruscan vases amply testify; but the name S. is quite modern, dating from about the middle of last century. It was taken from Etienne de Silhouette, the French



Silhouette of Robert Burns.

minister of finance in 1759, who, to replenish the treasury, exhausted by the costly wars with Britain and Prussia, and by excessive prodigalities, inaugurated numerous reforms, and the strictest economy of expenditure. His extreme parsimony in all finance matters made him a choice subject for caricature; so that any mode or fashion that was plain and cheap—'surtouts' without plaits, trousers without pockets—was styled *à la Silhouette;* and profiles made by tracing the shadow projected by the light of a candle on a sheet of white paper being then much in vogue, have continued to bear the name. Although without merit as a work of art, the S. presents a clear and well-marked profile, and such instruments as the Pantograph (q. v.), &c., used to be frequently employed to obtain profiles of a reduced size direct from the human features.—Profiles cut out of black paper with scissors also receive the name of silhouettes.

SI'LICA. See SILICON.

SI'LICON, or **SILI'CIUM** (sym. Si, eq. 14, spec. grav. 2·49), is one of the metalloids, or non-metallic elements. It may be obtained in three different forms or modifications—viz., the *amorphous*, the *graphitoid*, and the *crystalline*. It is the first of these, the amorphous silicon, which is obtained by the processes in common use, the second and third being obtained from this first modification.

Amorphous silicon presents the appearance of a dull brown powder, which adheres to the finger, is insoluble in water and in nitric and sulphuric acids, but readily soluble in hydrofluoric acid, and in a hot solution of potash. It is a non-conductor of electricity, and when heated in air or oxygen, its external surface burns brilliantly, and is converted into silica, which fuses from the extreme heat, and forms a coating over the unburned silicon. *Graphitoid*

silicon is obtained by exposing the amorphous variety to an intense heat in a closed platinum crucible. This form of silicon will not take fire when heated in oxygen gas, and resists the solvent action of pure hydrofluoric acid, although it rapidly dissolves in a mixture of nitric and hydrofluoric acids; moreover, as another point of difference, it is a conductor of electricity. For the description of *crystallised* silicon, we may refer to a treatise by Deville (in the *Ann. de Chimie*, 3d ser. vol. 49, p. 65), who obtained it in regular double six-sided pyramids of a dark steel-gray colour.

Silicon, in a state of combination with oxygen, is the most abundant solid constituent of our globe; and, in less proportion, is an equally necessary ingredient of the vegetable kingdom, while in the animal kingdom it occurs in mere traces, except in a few special cases. It is never found in nature except in combination with oxygen; but by a somewhat difficult process—which we need not here describe—it may be separated as a dark brown powder. It was first isolated by Berzelius in 1823. For our knowledge of the other modifications, we are indebted to Wöhler and Deville.

Silicon forms two oxides, one of which is only known in the hydrated state, while the other is the well-known compound, silica or silicic acid. *Hydrated oxide of silicon* is represented by the formula $2HO,3SiO$, and silicic acid by SiO_2. The hydrated oxide exhibits many interesting chemical properties, but is of no practical importance.

Silicic acid or *silica* exists both in the crystalline and in the amorphous form. The best examples of the crystalline form are rock-crystal, quartz, chalcedony, flint, sandstone, and quartzose sand. Silica in this form has a specific gravity of about 2·9, and is only attacked with difficulty by potash or hydrofluoric acid. The amorphous form exists naturally in opal, and is obtained artificially as gelatinous silica, &c.; it differs from the former in its specific gravity, being about 2·2, and in its being rapidly dissolved by potash and by hydrofluoric acid. Pure silica (as it occurs in rock-crystal, for example) is perfectly transparent and colourless, and is sufficiently hard to scratch glass. The heat of the oxyhydrogen blowpipe is required for its fusion, when it melts into a transparent glass, capable of being drawn out into elastic threads. Perfectly pure silica in its amorphous form may be obtained by various chemical processes. If a solution of silicate of potash or soda be treated with hydrochloric acid, the silicic acid separates as a hydrate, and on evaporating this to dryness, and treating it with boiling water, silicic acid remains as an amorphous powder, which, after being washed, dried, and exposed to a red heat, may be regarded as chemically pure. The hydrated silicic acid mentioned in the above experiment is soluble in water, and (more freely) in acids and alkalies. The solubility of hydrated silicic acid in water, accounts for the presence of silicic acid in mineral springs, and in the Geysers of Iceland, as well as for its gradual separation from these waters in the form of petrifactions. That silica or silicic acid is a true acid (although a feeble one), is obvious from its uniting with bases, especially those which are capable of undergoing fusion, and forming true salts, known as silicates. These silicates occur abundantly in nature; all the forms of clay, felspar, mica, hornblende, augite, serpentine, &c., being compounds of this description. Silicic acid combines with bases in various proportions. The following table, borrowed from Miller's *Elements of Chemistry*, vol. ii., shews the combinations which are of the most usual occurrence:

	Examples.	Formulæ.
$2MO,3SiO_2$, or Sesquisilicates.	Silicate of lime,	$2CaO,3SiO_3$.
	Meerschaum (hydrated silicate of magnesia),	$2MgO,3SiO_2 + 2HO$.
MO,SiO_2, Neutral silicates.	Wollastonite (silicate of lime),	CaO,SiO_2.
	Dioptase (hydrated silicate of copper),	$CuO,SiO_2 + HO$.
$2MO,SiO_2$, Dibasic silicates.	Olivine,	$2(Mg,Fe)O,SiO_3$.
	Iron forge cinder,	$2FeO,SiO_2$.
$MO,2SiO_2$, Bisilicates.	The composition of many of the ordinary varieties of glass may be approximately represented by mixtures of different silicates which have this formula.	

In the above formulæ, MO stands for 1 equivalent of any metallic protoxide, such as lime, magnesia, or protoxide of iron.

The following are the general characters of the silicates: Most of them are fusible, the basic silicates fusing more readily than those which are either neutral, or contain an excess of acid. Excepting the silicates of the alkalies, no silicates are soluble in water. The anhydrous, neutral, and acid silicates of the earths resist the action of all acids except the hydrofluoric.

In conclusion, we may remark that silica derives its name from *silex*, flint, of which it is the essential constituent, and that it is largely employed in the manufacture of glass, china, and porcelain. For these purposes, it is obtained in a finely comminuted state by heating flints or portions of colourless quartz to redness, and plunging them in cold water. The silica splits up into a friable mass, which may be easily ground to a fine powder. The use of silica in giving firmness and rigidity to various parts of the animal organs, is exemplified in its free occurrence in the quill-part of the feather of birds, in the shields of certain infusoria, and in the spicula occurring in sponges; while its similar use in the vegetable kingdom is seen in its more or less abundant presence in the stalks of the grasses, more particularly in the cereals and in the bamboo (where it is especially deposited about the joints, and is known as *Tabasbeer*), in the equisetæ, &c.

Silicon may be made to combine with several other elements besides oxygen, but, with the exception of silicofluoric acid, these compounds are of no practical value. Thus silicon and hydrogen form a hydride of silicon, a colourless and spontaneously inflammable gas. Nitride of silicon is a bluish fibrous body, while sulphide of silicon is a white earthy powder. Silicon unites with chlorine, bromine, and probably iodine and fluorine, in two proportions corresponding to its oxygen compounds. Fluoride of silicon (SiF_2) is a colourless pungent gas, liquefiable under strong pressure, and solidifying at −220°, inflammable, and a non-supporter of combustion. It is obtained by heating powdered glass with 12 times its weight of oil of vitriol, and when a stream of this gas is transmitted through water, a reaction takes place; two atoms of water and three atoms of the fluoride of silicon yielding silicofluoric acid (HF,SiF_2), which remains in solution, and silicon, which is deposited. A saturated solution of this acid forms a very sour fuming liquid, which does not directly attack glass, but if allowed to evaporate on it, causes erosion from the fluoride of silicon becoming evaporised, and free hydrofluoric acid being left. A dilute solution is frequently employed in the laboratory as a precipitant of potash, which it throws down in a transparent gelatinous form.

With salts of baryta, it gives a white crystalline precipitate. It combines with bases to form salts, none of which are of any special importance.

SI'LIQUE (*Siliqua*), in Botany, the fruit of the *Cruciferæ*, a capsule opening by two valves, which, when ripe, separate from the base upwards, leaving a central frame (*replum*), to which the seeds remain attached, and which is regarded as formed by parietal placentas, the valves giving way close to the suture. The seeds are either in one row or two. A SILICULE (*silicula*) is merely a silique of a different form, the true silique being long and narrow, the silicule broad and short, although Linnæus made this difference the foundation of the orders (*Siliquosa* and *Siliculosa*) of his class *Tetradynamia*, a distinction not now equally attended to in the subdivision of the natural order *Cruciferæ*.

SILI'STRIA, a strongly-fortified Turkish town, is situated on the right bank of the Danube, which is here nearly one-fourth of a mile wide, and is studded with numerous islands. The houses are mean, and built generally of wood, though sometimes of stone, and also of mud; the streets, like those of most Moslem cities, are crooked, narrow, dirty, and ill-paved; and the manufactures are insignificant, though there is a considerable trade in wood and cattle. Pop. 20,000. The importance of S. is almost wholly as a military outpost of Bulgaria, for it is the first convenient point for the crossing of the Danube by the Russians, the Dobrudsha or peninsula between the Danube and the sea being well protected from invasion by its deadly climate. Its walls are constructed of solid masonry, but consist merely of a fortified *Enceinte* (q. v.) surrounded by a ditch, the great strength of the fortress depending upon the support given to it by detached works. S. is a town of great antiquity, and was a fortress under the Byzantines. Here, in 971, the Byzantine emperor, John Zimisces, routed the Russians under Sviatoslav. It has been repeatedly assaulted and taken by the Russians. In 1849, S. was made a stronghold of the first class, and was rendered almost impregnable by the addition (1853) of 12 detached forts on the south and east. On the outbreak of the Crimean war, the Russians laid siege to it, with an army of from 60,000 to 80,000 men, while the Turkish garrison under Mussa Pasha amounted to 15,000; and after a vigorous and well-sustained attack of 39 days, the Russians were compelled to retreat, with the loss of 12,000 men.

SILK AND SILKWORM. The name *silk* is derived, by the not unusual substitution of *l* for *r*, from Lat. *sericum* (Gr. *serikon*), so called as coming from the country of the Seres or Chinese. The SILKWORM is the caterpillar of the SILKWORM MOTH, of which there are numerous species belonging to the genus *Bombyx* and other genera of the family *Bombycidæ*, lepidopterous insects of the section popularly known by the name Moth (q. v.). The *Bombycidæ* have a very short and rudimentary proboscis, living for a very short time in their perfect state, and taking little or no food; the body is thick and hairy; the wings are large and broad, either extended horizontally when at rest, or inclined like the sides of a roof; the antennæ are pectinated. The caterpillars feed on the leaves and other tender parts of trees or other plants; the chrysalids are enclosed in a cocoon of silk, which gives to some of the species a great economical importance. The most important is the COMMON SILKWORM (*Bombyx mori*), a native of the northern provinces of China. The perfect insect is about an inch in length, the female rather larger than the male; the wings meeting like the sides of a roof; the colour whitish, with a broad pale brown bar across the upper wings. The females generally die very soon after they have laid their eggs, and the males do not survive much longer. The eggs are numerous, about the size of a pin's head, not attached together, but fastened to the surface on which they are laid



Silkworm Moth (*Bombyx mori*), in its various stages.

by a gummy substance, which, when dry, becomes silky. They are laid in the end of summer, and are hatched in the beginning of next summer. The caterpillar is at first very small, not more than a quarter of an inch in length, but rapidly increases in size, till, when full grown, it is nearly three inches long. It is of a yellowish gray colour. The head is large. On the upper part of the last joint of the body is a horn-like process. The skin is changed four or five times during the growth of the caterpillar. Before each change of skin, it becomes lethargic, and ceases to eat, whereas at other times it is very voracious. When the skin is ready to be cast off, it bursts at the fore part, and the caterpillar then, by continually writhing its body, without moving from the spot, thrusts it backwards; but silkworms frequently die during the change of skin. A very rapid increase of size takes place whilst the new skin is still soft. The natural food of the silkworm is the leaves of the white mulberry, but it will also feed on the leaves of some other plants, as the black mulberry and the lettuce. When so fed, however, it produces silk of inferior quality. The silk-producing organs are two intestine-like tubes containing a viscid substance, which extend along great part of the body, and terminate together in a *spinneret* at the mouth. These vessels become very large when the change to the chrysalis or pupa state is about to take place. When about to spin its cocoon, the silkworm ceases to eat, and first produces the loose rough fibre which forms the outer part of the cocoon, and then the more closely disposed and valuable fibre of its interior. In this process, the position of the hinder part of the body is little changed, but the head is moved from one point to another; and the cocoon when finished is much shorter than the body, which, however, being bent, is completely enclosed in it. The cocoon is about the size of a pigeon's egg. Each fibre of silk, when examined by a microscope, is seen to be double, being equally derived from the two silk-producing organs of the caterpillar. A single fibre often exceeds 1100 feet in length. The time of the silkworm's life in the caterpillar state is generally about eight weeks. About five days are occupied in the spinning of the cocoon; after which about two or three weeks elapse before the cocoon bursts and the perfect insect comes forth. The natural bursting of the cocoon is, however, injurious to the silk, and the silkworm rearer prevents it by throwing all the cocoons into boiling water, except those which he intends to keep in order to the maintenance and increase of his stock. These he selects with care, so that he may have about an equal number of males and female insects, the females being

known, even in the chrysalis state, by their larger size. The cocoons intended for the production of moths are placed on a cloth in a somewhat darkened room, of which the temperature is near, but does not exceed 72° F.; and the moths, when produced, shew no inclination to fly away, but remain on the cloth, lay their eggs, and die there. It is an interesting peculiarity of this valuable species of moth, that neither in the caterpillar nor in the winged state does it shew that restless disposition which belongs to many others, the caterpillars remaining contentedly in the trays or boxes in which they are placed, feeding on the leaves with which they are there supplied, and at last only seeking a proper place to assume the chrysalis form on small bundles of twigs which are placed for that purpose above the trays; the perfect moths, in like manner, abiding almost in one spot, and scarcely caring to use their wings. By this peculiarity it is capable of being reared and managed in a way which would otherwise be impossible.

The silkworm is liable to various diseases, particularly to one by which great numbers are often destroyed, and which is either caused or characterised by the growth of a small fungus known as *Silkworm-rot*, or *Muscardine* (q. v.).

Of the other species of silkworm, many are rapidly increasing in commercial importance. The following is an enumeration of the chief silk-producing insects; those in Italics are not as yet employed in manufactures:

Bombyx mori.—The common silkworm, native of India, and reared in other parts of the world.
B. cresi.—Crosses have been obtained between this and B. mori, yielding excellent silk, at Mussooree.
B. textor.—Native of Mussooree.
B. sinensis.—China.
B. Huttoni.—Silk collected in Mussooree.
B. Horsfieldi.—Native of Java.
Attacus atlas.—Native of India, and said to yield some of the 'Tusseh Silk.'
A. Guerini.—Native of Bengal.
A. ricini.—Native of Assam.
A. cynthia.—The 'Eria,' or 'Arrindy' silkworm, native of India, now extensively raised in Hong-kong, Nepaul, Mussooree, Java, and to some extent in Southern Europe. It feeds on the leaves of the Ailanto (q. v.) tree.
Antheræa Mezankooria.—The Mezankooria silk-moth.
A. Paphia.—The true Tusseh or Tussur Moth, native of Darjeeling, and other parts of Upper India. It is produced very extensively, and is chiefly collected in the jungle districts by the Sahars and other half-wild castes who live in the jungles. The cocoons are so carefully concealed in the leaves, that much care is required to discover them, the only indication being the dung of the caterpillar under the trees. The tusseh silk is easily wound off from the cocoons in the same way as that of the common silkworm.
A. Assama.—The Moonga, or Moogha, native of Assam.
A. Pernyi.—North China.
A. Perrottetti.—North China.
A. Roylei.—Mussooree.
A. Helferi.—Darjeeling.
A. Jana.—Java.
A. Frithii.—Darjeeling.
A. Larissa.—Java.
The preceding seven are all called Tusseh moths.
Actias Selene.—Darjeeling.
Saturnia pyretorum.—China.
S. Grotei.—Darjeeling.
Lapa Katinka.—Java.
Neoris Huttoni.—Mussooree.
Caligula Tibeta.—Mussooree.
C. Simla.
Salassa Lola.—South-east Himalaya.
Cricula triferrestrata.—Java.

It will be seen by the above list that hitherto very few of the silk-moths have been turned to man's profit. The first in importance after the common silkworm is the true *Tusseh*, next, the *Moonga*, the silk from both of which can be wound off the cocoon; and then the *Eria*, which cannot be wound easily, and is therefore generally carded.

Silk appears not to have been well known to the ancients; although several times mentioned in the translations of the Bible, the best authorities deny that it is in the original, or that it was known to the Hebrews. Among the Greeks, Aristotle is the first who mentions it, and he only says that 'Pamphile, daughter of Plates, is reported to have first woven it in Cos;' and from all the evidence which has been collected, it would appear that the natives of Cos received it indirectly (through the Phœnicians and Persians) from China. The silken webs of Cos found their way to Rome, but it was very long before they were obtainable except by the most wealthy. The cultivation in Europe of the worm itself did not take place until 530 A.D., when, according to an account given by Procopius, the eggs were brought from India (China) to the Emperor Justinian by some monks.

In China, the cultivation of silk is of the highest antiquity, and according to the greatest Chinese authorities, it was first begun by Si-ling, the wife of the Emperor Hoang-ti, 2600 years B.C., and the mulberry was cultivated for the purpose of feeding them only forty years later.

Since its introduction to Europe, it has always formed a great branch of industry in Italy, Turkey, and Greece, and it has been cultivated to some extent in France, Spain, and Portugal. In England, too, from time to time, laudable efforts have been made to cultivate it, especially by Mrs Whitby of Newlands, Mr Mason of Yately in Hampshire, and Lady Dorothy Neville of Dangstein in Hampshire; but their partial success has not encouraged others to pursue this branch of industry, which requires a warmer and less variable climate and cheaper labour than we can command.



Ailanto Silkworm (reduced), shewing the Cocoon of Silk attached to a Leaf.

The quantity of silk raised in the world is enormous. Great Britain imports annually in the unmanufactured state: 'Raw' silk, about 9,250,000 lbs.; 'waste,' or knubs and husks, about 3,500,000 lbs.; besides undyed 'singles,' about 5700 lbs.; tram, about 7000 lbs.; organzine, about 39,000 lbs.; and dyed singles and tram, about 3000 lbs.; organzine, about 10,000 lbs. Singles, tram, and organzine are terms applied to the thread after it has undergone certain operations (to be afterwards described). The total quantity is thus 12,814,700 lbs., of the

value of £10,000,000; and in addition to this we import manufactured silk goods to the value of about six millions and a half sterling; so that the importance of this little insect to Great Britain alone is represented by about £16,500,000. It requires 1600 worms to raise a pound of silk.

Rearing of Silkworms.—It is of the first consequence in the production of silk that one of the species of mulberry should be cultivated, and that it should be so favourably situated as to climate, that its foliage is in readiness for feeding the young worms when they are first hatched from the eggs. The species best adapted is the white mulberry, *Morus alba.* The extreme lateness of season at which the black mulberry produces its leaves, prevents its employment generally, besides which it will not bear the loss of its leaves so well. It is said that in some parts of China the silkworm is easily reared upon the trees in the open air. So little has it a tendency to wander far from the place of its birth, if food be at hand, that it only requires a warm dry atmosphere to bring it to perfection; but usually, even in China, and in all other countries, it is thought desirable to raise the silkworm in properly arranged buildings, and to supply it with mulberry leaves gathered from day to day. In India, China, and other tropical countries, the eggs hatch readily at the proper time by the natural heat; but in Southern Europe, artificial heat is almost always required; formerly, the heat of fermenting dung was found serviceable, and the warmth of the human body was also used, the eggs being carried in little bags in the bosom of the cultivators; but now they are regularly hatched by stove-heat, beginning with a temperature of 64° F., which is gradually increased through ten days to 82°, at which it is maintained until the eggs are hatched. Experience has shewn that the operation is facilitated by washing the eggs in the first place with clean water; and some cultivators also wash them in wine, the value of which is very questionable. Washing is found to remove a certain gumminess and other impurities from the eggs, which would otherwise impede the hatching. When the silkworms have been regularly developed as above described, it is usual to place above the trays various little contrivances for the caterpillar to spin within: many of the Italian growers employ an ingeniously simple arrangement, which lasts many seasons, and when not in use, occupies very small space. It consists of a number of thin slips of wood, about an inch and a half broad, and all cut sufficiently long to reach across the trays. They are each cut at intervals of an inch half through, as in fig. 1, so that one will fit into another, as in fig. 2; and when complete, they all form a series of cells, which, set in a tray (fig. 3), form the very best receptacles for the silkworm to spin in. When not in use, the whole arrangement can be compressed into very small compass, as in fig. 4, for convenience of storage. Others use little cones of paper, or small twigs, amongst which the cocoons are spun.

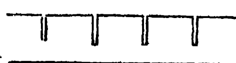


Fig. 1.

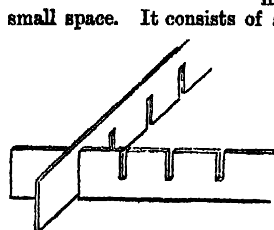


Fig. 2.

In feeding the worms, care is taken so to distribute the food on the shelves or in the trays that the insects shall not crowd together; and for this reason, the most careful cultivators chop the leaves small, and strew them very evenly about. Great care is taken not to let the worms of one hatch mix with those of another, unless of exactly the same age, otherwise the stronger insects would deprive the younger of their food. Many other niceties of attention are required, which altogether render the successful rearing of silkworms a matter of much anxiety and labour.

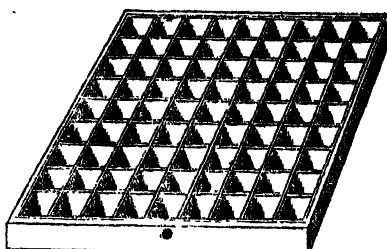


Fig. 3.

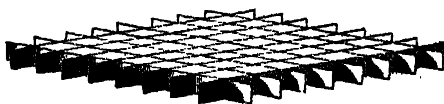


Fig. 4.

Preparation of Silk.—When the cocoons are completed, which is known by the absence of any sound within, they are carefully sorted, and a certain number are kept for laying. The sexes are readily known by the difference of shape as well as of size, the female being plumper, as in fig. 5, and the male (fig. 6), besides being much smaller, having a central depression and sharper extremities. The French growers sort them into nine varieties, those which are less compact, or in which the worm has died—a fact known by external indications—being separated from the good ones. When the sorting is finished, the cocoons are placed in an oven with a gentle heat, which kills the enclosed chrysalis, otherwise they would all become *perforated* by the insect eating through; they are then prepared for winding by first removing the flossy covering, which is often somewhat hard and compact. The cocoons are placed in basins of water, kept warm by charcoal fires, or, in the larger establishments, by steam. This softens and dissolves the natural gum which coats the silk, and makes the various coils of silk adhere together in the cocoon. The operator then takes a small branchy twig, and stirs them about in the water. This is sure to catch hold of any liberated ends which may be floating in the water. From three to five of those ends are taken and twisted together with the fingers, so as to unite them into one thread, which is passed through a polished metal or glass eye in the reeling-machine, which is so far from the hot-water basin as to give the softened gum on the silk time to dry in its passage from the basin to the reel. In large *filatures* or silk establishments, complex machinery is used for winding; but reeling apparatus of the greatest simplicity is used by the Chinese, East Indians, and



Fig. 5.



Fig. 6.

others with almost equal effect, when carefully done, except in the amount of work accomplished. In all cases, however, the principle is the same, and is very simple, as shewn in fig. 7, in which *a* shews the small pan of warm water holding the cocoons,

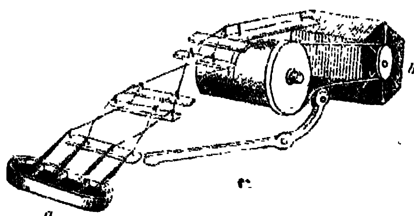


Fig. 7.

the threads from which are gradually united, and wound on the reel *b*. Great care and skill are required in reeling silk from the cocoons, because, although the reeler starts with four or five cocoons, not only are their individual threads apt to break, but they are not all of the same length, so that one will run out before the others. These matters are carefully watched; and as often as a thread breaks, or a cocoon runs out, another thread is joined on, and is made to adhere to the compound thread on the reel by its natural gumminess. Each cocoon generally yields 300 yards of thread, so that it takes 1200 or 1500 yards to make 300 yards of the filament of raw silk, by which name the reeled silk is always known. The raw silk is made up into hanks of various sizes. That from China and Japan is tied in packages of six hanks each, technically called *books*, and sometimes the ends of these books are covered with silken caps very curiously formed out of a single cocoon, so managed as to form a filmy cap sufficiently large to cover a man's head. The method used by the Chinese to accomplish this is quite unknown in Europe. These caps or bags, when closed, are sometimes nearly a foot square, and much of the wadding used by the Chinese dressmakers for padding is made by placing these bags upon each other to the required thickness.

Notwithstanding the care taken in reeling the silk from the cocoons, and forming several threads into one, it is not ready for the weaver, but has to undergo the processes called collectively *throwing*. In this country, this is a special trade, the *silk throwster* usually conducting it in large mills with extensive machinery, where the above processes are all carried on, generally by steam-power. The silk reaches the throwster in hanks as imported. These are put into clean soap and water, and carefully washed, ties having been placed at intervals, to prevent the silk entangling. After being dried by hanging in

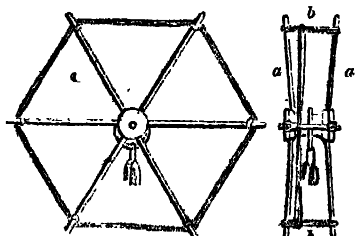


Fig. 8. Fig. 9.

the drying-room, they are placed on large skeleton reels called *swifts* (fig. 8), so adjusted that they will hold the hanks tightly. Fig. 9 is a front view of a *swift*, and shews that the spokes, *a*, *a*, are in pairs. They are made of thin pieces of lancewood, and each pair are rather nearer together at the axle than at the circumference, where they are connected together by a small band of cord, *bb*. These bands are so tied that they will slip down easily to admit of the hanks being placed; then, by pushing the cords upwards, the hank can be stretched to its fullest extent. This is necessary to compensate for the varying lengths of the hanks received from different countries.

When the *swifts* are set in motion, the silk is carried from the hanks to bobbins, upon which it is wound for the convenience of further operations. The bobbins are then taken from the *winding* to the *cleaning* machine, when they are placed on fixed spindles, so that they will turn with the slightest pull; and the thread is passed through a small apparatus attached to the machine, which is specially called the cleaner, and consists essentially of two polished smooth-edged blades of metal (*a*, *a*, fig. 10), attached to a part of the frame of the machine, *b*. They are held together by the screw *c*, and are slightly opened or closed by the other screw, *d*, so that the thread can be put between them down to the small orifice, *e*, and then, by tightening the screw, preventing its return, after passing through this small hole, which is the gauge of the thread, and which removes any irregularities or adherent dirt. The silk next passes over a glass or metal rod, and then through another small hole, much larger than that of the *cleaner*, and usually made of glass, on to the bobbin, upon which it is wound by the action of the machine. The next process is *twisting* the cleaned thread, by which it becomes better adapted for being combined with other threads. *Doubling* is the next process, and this consists in running off a number of bobbins of *twisted* silk on to one bobbin of a larger size, which is put into the *throwing*-machine, when the ends of the *doubled* silk are passed through a smooth hole on to a large reel, which rewinds it into hanks, but twisting the threads into a fine cord as it goes from the bobbins to the reel. This operation of *throwing* derives its name from the Saxon *thrawan*, to whirl or twist. After this, the hanks have to be again wound on reels and bobbins for the weaver, the former for the warp, and the latter for the weft. For many purposes, only some of these operations are required. Thus for common and light fabrics, such as *Persian*, *gauze*, &c., only the two first are needed—viz., the *winding* and *cleaning*, and the material is called *dumb-singles*. If it has been *wound*, *cleaned*, and *thrown*, it is called *thrown-singles*, and is used for weaving common broad stuffs, or plain silks and ribbons. If *wound*, *cleaned*, *doubled*, and *thrown*, it is called *tram*, and is used for the richer silks and velvets, but only for the weft or shoot; and if *wound*, *cleaned*, *spun*, *doubled*, and *thrown*, it is called *organzine*, and is used for the warps of fine fabrics.

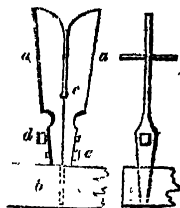


Fig. 10.

Before winding the cocoons, a flossy portion has to be removed; and after all has been wound off, another portion remains, like a compact bag; these are collected and sold under the name of *waste-silk*, and to these are added the fragments of broken threads, which accumulate in considerable quantities during the reeling and throwing operations. Formerly, very little use was made of waste-silk; not a little of it was employed by engineers and others for mere cleaning purposes; although, as early as

1671, a proposition was made by a manufacturer named Edmond Blood to make it available by carding it with teasels or rowing-cards. He took out a patent for this invention, but apparently did not bring it into use. Another patent was taken out for the same thing in 1855, by Louis Narcisse Dupont, and from this time it has been all spun into yarn, thereby greatly economising the use of silk, as the quantity of silk-waste always greatly exceeds the amount of good silk reeled off. The processes employed in the production of silk-yarn from the waste differ little from those for spinning other materials. See SPINNING.

The silk-manufactures of Britain are chiefly located in Spitalfields, London, at Macclesfield and Congleton in Cheshire, at Derby, and in Glasgow. The dyeing of silk is done chiefly in the neighbourhood of London, at Nottingham, and at Manchester; and considerable quantities of silk goods are sent from India to be printed with patterns in London and other parts of England. These goods are chiefly the corah and bandana pocket-handkerchiefs, and Indian waist and turban scarfs.

SILK-COTTON. Under this name, various silky fibres are from time to time brought from tropical countries to Europe; they are all of the same general character, and are produced by the trees composing the genus *Bombax* and other genera recently separated from *Bombax*, of the natural order *Sterculiaceæ*, known as silk-cotton trees. These trees are natives of the tropical parts of Asia, Africa, and America. The fibre fills their large woody capsules, enveloping the seeds, and is produced in great abundance; but is too short, too smooth, and too elastic to be spun by the machinery used for cotton; although attempts have been successfully made on a small scale in India to spin and weave it; and that of *Bombax villosum*, which is of a beautiful purple colour, is woven into cloth and made into articles of dress in New Spain. Silk-cotton is much used for stuffing pillows, mattresses, and sofas. Sir James Emerson Tennent says it 'makes the most luxurious stuffing' for them. It has the fault, however, of being easily broken and reduced to powder, but might probably be very useful in the manufacture of gun-cotton and collodion. The silk-cotton of the East Indies is imported into Britain under the name of *Moc-main*. —*Bombax ceiba*, the common silk-cotton tree of the West Indies and South America, attains a very great size, its trunk sometimes being so thick that it could not be encompassed by the outstretched arms of sixteen men, and canoes are hollowed out of it of an average burden of twenty-five tons. The wood is soft and spongy, but is used for many purposes, and when cut into planks, and saturated with lime-water, it bears exposure to the weather for many years.—*Bombax Malabaricum*, or *Salmalia Malabarica*, is the common Silk-cotton Tree of the East Indies. It is a tall tree, covered with formidable thorns. Although it is a tropical tree, its leaves fall annually; and just before the fresh leaves appear, it is covered with crimson tulip-like flowers, so abundant, that 'when they fall, the ground for many roods on all sides is a carpet of scarlet.'

The fibre of the capsules of *Chorisia speciosa* and *C. Pecholtiana* trees nearly allied to the genus *Bombax*, and natives of Brazil, is known as VEGETABLE SILK. It has a beautiful satiny lustre, and is very light, but no mode of spinning and weaving it has yet been invented.

SI'LKWORM GUT, a material used by anglers for dressing the hook-end of the fishing-line. It is prepared from the silkworm at the period when it is just about to spin, and the sericteria or silk vessels are distended with the secretion. The worms are immersed for twelve or fourteen hours in strong vinegar, and then taken separately, and pulled in two very gently. The skilled operator knows at sight if the soaking in vinegar has been sufficient, and if so, he lays hold of one end of the viscid secretion, which is seen in the silk glands, and attaches it to the edge of a board; the other end he stretches to the other edge of the board, and attaches it with a pin. When a number are drawn across the board, it is set in the sun for the threads to dry, when they are tied into bundles for use. They are chiefly produced in Italy and Spain.

SILL, the horizontal wood or stone base along the bottom of a window or door; also the wooden plate along the bottom of a partition.

SILLIMAN, BENJAMIN, American physicist, was born at North Stratford (now Trumbull), Connecticut, U. S., August 8, 1779. His father was a distinguished lawyer, and a brigadier-general in the War of Independence. He was educated at Yale College, New Haven, in which he was appointed a tutor in 1799, and was admitted to the bar in 1802, but soon after received from the college the appointment of Professor of Chemistry; which he accepted only on condition of visiting some of the seats of learning in Europe, to observe the progress of the science. His tour in Europe, 1805—1806, was one of the first of which an account was published in the United States. Uniting mineralogy and geology to chemistry, he made a geological survey of Connecticut, observed the fall of a meteorite; constructed, with the aid of Professor Hare, a compound blowpipe, and repeated the experiments of Sir Humphry Davy. In 1822, he first established the fact of the transfer of particles of carbon from the positive to the negative electrode of the voltaic apparatus. In 1818, he founded the *American Journal of Sciences and Arts*, better known as *Silliman's Journal*, of which he was for twenty years the sole, and for eight more the principal editor. Besides his labours as professor and editor, he began in America the since widely-extended work of popular scientific education, by giving public lectures on his favourite sciences in all the chief cities. In 1830, he published a text-book on Chemistry, and soon afterwards edited an edition of *Bakewell's Geology*. An account of his last visit to Europe was published in 1851, and reached six editions. His last course of lectures was given in 1855, when his son, BENJAMIN SILLIMAN, jun., who had been his associate, became his successor. He died at New Haven in November 1864.

SILU'RIAN ROCKS, a large division of the Palæozoic rocks between the Old Red Sandstone and the Cambrian strata. They comprise the greater portion of the rocks called by Werner 'transition,' because, as he thought, in their structure they exhibited an intermediate character between Lehman's 'primary' or metamorphic rocks, and the 'Secondary' or fossiliferous deposits. But the fossils peculiar to these beds having been found in rocks without the transition structure, the name has long ago fallen into disuse. The term 'grauwacke' or 'graywacke,' a miners' term, was also introduced from the Germans, and for some time employed to designate these rocks, because of the abundance in them of a compact argillaceous sandstone; but this awkward name has also given place to Silurian, a term introduced by Sir R. I. Murchison when he first established the system, and derived from the district where he investigated the strata, which was the region of the Silures, a tribe of ancient Britons.

The Silurian system contains an enormous thickness of rocks, nearly 30,000 feet, according to some estimates, the absolute thickness being greatly increased by immense beds of interstratified igneous rocks. The upper limit, underlying the Old Red Sandstone, is universally accepted, but there has been considerable diversity of opinion in regard to the inferior boundary. Professor Sedgwick, having described the rocks of North Wales, which at first were considered to be older than the series which Murchison had illustrated, designated them Cambrian. This name has been retained for the immense mass of indurated shales and sandstones of a thickness nearly equal to that of the Silurians, which contain only faint traces of organic life, and underlie the Llandeilo formation. But Sedgwick claims also the Lower Silurian rocks as a portion of his system; the priority of name, and the uniform facies of the organic remains of the whole of the Silurian rocks, have, however, induced geologists to consider the limits as originally given by Murchison as those of the system.

The subdivisions of the rocks of the period are the following:

	Thickness in Feet.
Upper Silurian Rocks.	
Upper Ludlow—	
1. Downton Sandstone and Tilestones,	80 to 1000
2. Upper Ludlow Shale,	800
Lower Ludlow—	
3. Aymestry Limestone,	150
4. Lower Ludlow Shale,	900
Upper Wenlock—	
5. Wenlock Limestone,	300
Lower Wenlock—	
6. Wenlock Shale,	1400
7. Woolhope Limestone and Denbighshire Grit,	150
Middle Silurian Rocks.	
Upper Llandovery—	
8. Tarannon Shale,	1000
9. May-hill Sandstone and Pentamerus Limestone,	800
Lower Llandovery—	
10. Llandovery Slates,	1000
Lower Silurian Rocks.	
Caradoc—	
11. Caradoc Sandstone,	12,000
12. Bala Limestone,	
Llandeilo—	
13. Upper Llandeilo,	1500
14. Lower Llandeilo or Arenig Beds,	
Contemporaneous Volcanic Rocks,	5800

The typical Silurian strata are in Wales, and the adjoining English county, Shropshire. With the exception of the southern and south-eastern districts, where the Old Red Sandstone and Coal Measures occur, the whole of Wales is composed of Silurian and Cambrian rocks. The same deposits are found in Cumberland and the north of Lancashire. The whole of Scotland south of a line drawn from Dunbar on the east to Girvan on the west, consists of graywacke rocks, slates, and limestones of Silurian age, with the exception of one or two small patches of Old Red, Carboniferous, and Permian strata. The rocks, till recently referred to an azoic group, below the lowest fossiliferous strata in the north of Scotland, are now generally believed to be highly altered beds of this period. The southern boundary of these beds is a line drawn from Stonehaven to Helensburgh. A huge trough, filled up with Old Red Sandstone and Carboniferous strata, separates the highly altered strata of the north from the less altered deposits of the south. An extensive region of Silurian rocks occurs in the south-eastern counties of Ireland and in Galway; and a great track of the same beds extends from the centre of Ireland (Cavan, &c.) to the coast of Down. The metamorphic rocks of the north-west are most probably also of the same age as the corresponding strata in the north of Scotland.

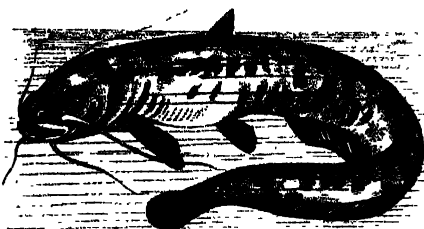
On the continent, Silurian strata have been examined and co-related with the British types, in Bohemia, by M. Barrande; in Scandinavia, by M. Angelin; and in Russia, by Murchison and others. In North America, also, extensive regions are covered with these strata. They have been wrought out and their fossils described by the Canadian and United States surveyors. Similar strata have also been detected in India, Australia, and South America.

The life of the period presents a group of very characteristic organisms, which, with the exception of the fish-remains found in the upper beds, all belong to the invertebrata. Many of them are confined to the Silurian rocks, or occur only very rarely in some of the Palæozoic formations. The Graptolites are a strictly Silurian family of Zoophytes, and most of the forms of Trilobites are found only in this period, though some members of the tribe are found in rocks of Devonian and Carboniferous age. Besides these, may also be specified such forms as Heliolites and Favosites among the Corals; Actinocrinites and the Cystidians among the Echinoderms; Orthis and Lingula among the Brachiopods; and Lituites and Maclurea among the Cephalopods.

In all the immense thickness of Silurian rocks, no deposit has been discovered containing organisms that have lived on land. Some fragments have been noticed that have a faint resemblance to the branches of Lepidodendron, and minute bodies occur in the bone-bed, which are referred to the spores of a terrestrial cryptogam. The only other indications of plants are impressions believed to have been produced by sea-weeds. The anthracitic shales of Wales and Scotland probably derived their anthracite from the algæ that must have abounded in the Silurian seas. In Shropshire, a number of shells have been found, whose nearest allies are littoral species, and these appear to indicate the existence there of an ancient shore. The Silurian rocks are, however, generally sea-deposits, and Forbes has ingeniously shewn, from the small size of the conchiferæ, the paucity of spiral univalves, the great number of floating shells and of the pelagic Orthidæ, and the great rarity, or absence, except in the upper beds, of fossil fish, that it is most probable they were deposited in a sea more than 70 fathoms deep.

SILU'RIDÆ, a family of malacopterous fishes, divided into many genera, and including a great number of species, mostly inhabitants of the lakes and rivers of warm countries. The S. exhibit great diversity of form. Their skin is generally naked, but some have a row of bony plates along the lateral line, and a few are completely mailed with bony plates. The dorsal fin is single in some; others have two dorsal fins, the second being sometimes adipose, as in the salmon family. The dorsal fin is sometimes armed with a strong spinous ray, and in most of the family the first ray of the pectoral fins is very strong and serrated, so as to be capable of inflicting a severe wound, and by this these fishes are protected from alligators and other enemies. All have the mouth furnished with barbels, more or less numerous; the two principal barbels being on the upper lip, and formed by elongation of the intermaxillary bones. The barbels are believed to be organs of touch, probably of use in directing the fish to its prey. The bones of the head and other parts of the skeleton exhibit many peculiarities, into which we cannot enter. The S. are generally inhabitants of muddy rivers, lurking amongst the mud. The only European species is the Sly Silurus, Sheat-fish, or Shaden (*Silurus glanis*), the largest

of European fresh-water fishes, and sometimes found in the sea near the mouths of rivers. It does not inhabit any of the rivers of Britain; its introduction has, however, recently been attempted. Neither is it found in France, Spain, or Italy, but it is plentiful



Sly Silurus (*Silurus glanis*).

in the Danube, the Elbe, and their larger tributaries, also in the rivers which fall into the Caspian Sea; and it is found in some of the rivers of North America. It attains a length of six or even eight feet, and a weight of 300 or 400 pounds. The flesh is white and fat; but soft, luscious, and not very easily digestible. In the northern countries of Europe, it is preserved by drying, and the fat is used as lard. The habits of the fish are sluggish; it seems rather to lie in wait for its prey than to go in quest of it.—Several species of this family are found in the Nile, among which is the HARMOUTH or KARMOOT (*Clarias anguillaris*), a fish in its general form and appearance much resembling that just described. It was anciently an object of superstitious regard in the Thebaïd.

SI'LVAS, or SELVAS (Span. *selva*, a forest), the name given to the western portion of the great plain of the Amazon, in the north-west of Brazil. The Silvas, which are about one-third of the whole plain, contain more than 700,000 English sq. m., and consist of low land on a dead level, densely covered with primeval forests, and annually inundated by the overflow of the mighty river or its tributaries. The forests are rendered wholly impenetrable from the denseness of the underwood, matted together as it is by creeping and climbing plants, which form myriads of festoons glowing with nature's brightest tints. The vegetation of the Silvas, under the stimulating action of the abundant irrigation, the intense tropical heat, and the inconceivable richness of the alluvium which constitutes the soil, shews an exuberance of growth far surpassing that of any other portion of the earth's surface, and from its very luxuriance, presents a bar to civilisation no less effectual than do the barren deserts of Africa or the gloomy wastes of Central Asia. The few Europeans who have penetrated into this region have sailed up the Amazon and some of its tributaries, and from them we have received the little knowledge that we do possess of this immense tract of wild forest. It is the haunt of innumerable wild animals, especially monkeys and serpents, and of a few aboriginal inhabitants, who are sunk in the lowest stage of barbarism.

SILVER (symb. Ag., equiv. 108, sp. gr. 10·53) is a metal which, in its compact state, is of a brilliant white colour, possesses the metallic lustre to a remarkable degree, is capable of being highly polished, and evolves a clear ringing sound when struck. It is harder than gold, but softer than copper, and is one of the most ductile of the metals. It is malleable, may be hammered into very thin leaves, and may be drawn out into very fine wire, the thinnest silver-leaf having a thickness of only $\frac{1}{100000}$th of an inch, and one grain of the metal being capable of yielding 400 feet of wire. It possesses a high degree of tenacity, a wire with a diameter of $\frac{1}{12}$th of an inch being able to support a weight of nearly 188 pounds. It requires a heat of 1873° Fahr. to fuse it, and on cooling, expands at the moment of solidification. It is an excellent conductor of heat and electricity, and is not affected by exposure even to a moist atmosphere at any temperature. When, however, it is fused, it absorbs a considerable quantity of oxygen, which it expels in the act of solidification with a peculiar sound, technically known as *spitting*.* But although it does not rust or become oxidised, it usually becomes tarnished on prolonged exposure to the air, owing to the formation of a film of sulphide (or sulphuret) of silver, and this change occurs more rapidly in towns than in the country, in consequence of sulphuretted hydrogen being more abundant in the atmosphere of the former than of the latter. This metal is unaffected by the hydrates or nitrates of the alkalies, even at a high temperature, and hence silver crucibles, &c. are highly useful in many laboratory operations.

Hydrochloric and dilute sulphuric acid have scarcely any action on silver, but nitric acid and boiling sulphuric acid oxidise it, and form salts; nitric acid being by far its best solvent. Silver has strong affinities for chlorine, bromine, iodine, and sulphur, and combines with the first three and sulphuretted hydrogen at ordinary temperatures. It is well known that common salt, especially in the melted state, when left for any time in contact with silver, corrodes that metal, soda being formed from the oxygen of the air, while the liberated chlorine attacks the silver.

Silver is frequently met with in the native state, crystallised in cubes or octahedrons, or occurring in fibrous masses. It is also found in combination with gold, mercury, lead, antimony, arsenic, sulphur, &c., and sulphide of lead is almost always accompanied with a greater or less amount of sulphide of silver; it is, however, never found as an oxide.

Silver forms three compounds with oxygen—viz., a suboxide, Ag_2O; an oxide, AgO; and a peroxide, AgO_2. All these oxides possess the common properties of being reduced by heat to the metallic state, and of being very readily decomposed by the action of light. The oxide, AgO, is the only one of these compounds requiring special notice. It is a dark-brown heavy powder, devoid of taste or smell, somewhat soluble in water, to which it communicates a metallic taste and an alkaline reaction. It acts as a powerful base, neutralising the strongest acids, and forming normal salts with them. It is obtained by the addition of a solution of potash to a solution of the nitrate or any other soluble salt of silver, falling as a hydrated oxide, which, at a temperature above 140°, becomes anhydrous. If a concentrated solution of ammonia be digested for some hours upon freshly precipitated oxide of silver, Fulminate of Silver (q. v.), or Fulminating Silver in the form of a black powder is produced, and the same dangerous compound is formed when an ammoniacal solution of nitrate or chloride of silver is precipitated by potash.

The salts which the oxide of silver forms with acids are characterised by the readiness with which they decompose, the mere action of light blackening and partially reducing them. None of these salts occur in nature. The following are the most important of those which have been formed artificially.

* Although ordinary air has no oxidising action on silver, ozonised air rapidly attacks it.

Nitrate of Silver (AgO,NO_5) crystallises in large, colourless, transparent square tablets, which blacken on exposure to light, or in contact with organic matters, owing to reduction, and dissolve in their own weight of cold water. This property of producing a permanent black colour with organic matters has led to its employment as a *marking ink** for linen, &c. The black stains which it forms on the skin, on linen, &c., may be removed by the employment of a strong solution of iodide of potassium, or more readily by a solution of cyanide of potassium. The crystals fuse at a temperature of about 425°, and the molten mass, when cast into cylindrical moulds, solidifies, and forms the sticks of *lunar caustic* which are employed in surgery, medicine, and Photography (q.v.). Nitrate of silver is prepared by dissolving pure silver in moderately strong nitric acid, and evaporating till the solution is sufficiently concentrated to crystallise. 'The most characteristic test for the salts of silver is the action of hydrochloric acid, or of a soluble chloride, which produces a white curdy precipitate of chloride of silver, insoluble in nitric acid, but readily soluble in ammonia; it is also soluble in hyposulphite of soda, with which it forms an intensely sweet solution; cyanide of potassium also dissolves it; the chloride of silver speedily assumes a violet tinge when exposed to light.'—Miller's *Elements of Chemistry*, 2d ed., vol. ii. p. 732.

Of the haloid salts of silver, several occur native. The most important of these compounds is *chloride of silver* ($AgCl$), which is found native either in cubes or in a dense semi-transparent mass, and is known as *horn silver*, and may be procured as a dense white flocculent precipitate by the procedure described in the preceding paragraph. In consequence of its sensibility to light, it is employed in photography. When heated to about 500°, it fuses into a yellow fluid, which, on cooling, solidifies into a yellowish gray semi-transparent horny mass. This salt is insoluble in water and in all the diluted acids, but dissolves in a solution of ammonia, from which it crystallises in octahedra. Its solution in a solution of hyposulphite of soda is employed in silvering iron, copper, and brass goods. Traces of this salt are found in sea-water, the chloride of sodium probably acting as the solvent. *Bromide of silver* ($AgBr$) is found in Mexico, where it is known as *Plata verde*, or green silver, in the form of small crystals or crystalline granules of a pale olive-green tint. *Iodide of silver* (AgI) occurs native in several Mexican mines in the form of thin, flexible, pearly scales.

Sulphide (or *sulphuret*) *of silver* (AgS) is the principal ore of silver. It occurs native, sometimes crystallised in cubes or octahedra, and sometimes in masses. From its gray metallic lustre, it has received from mineralogists the name of *silver glance*. It is well known that if silver spoons are allowed to remain in contact with boiled eggs for some time, they become tarnished by the action of the sulphur; a minute quantity of sulphuretted hydrogen being probably evolved. The discoloration is easily removed by washing the darkened silver with a solution of cyanide of potassium. Sulphide of silver unites with various other metallic sulphides when fused with them, especially with the sulphides of arsenic and antimony. *Red silver ore* ($3AgS,SbS_3$) is a native compound of this kind.

The alloys of silver and copper (see Alloy and Mint), when cast into ingots, are usually found to differ in their composition in the internal and external parts, in consequence of a molecular change that takes place during the cooling and slow solidification of the molten mass. In bars containing more than 719 parts of silver in 1000, the central portions are richer in silver than the exterior; in alloys of less value, the reverse is observed, while in ingots containing 950 or more parts of silver in 1000, the composition is nearly uniform throughout. When exactly 719 parts of silver and 281 of copper are combined (corresponding to the formula Ag_3Cu_4), no separation whatever of the metals occurs. Many metals, as tin, zinc, antimony, bismuth, arsenic, &c., when mixed with silver, render it brittle and unfit for its ordinary uses; they are, however, easily removed in the process of refining. An alloy consisting of five parts of silver, six of brass, and two of zinc, is used as a solder for silver. An alloy of silver and mercury, known as *silver amalgam*, occurs native in a crystallised form. It is a mineral of a silvery white colour, and its composition is represented by the formula, $AgHg_2$.

Silver, like gold, has been known and prized from the earliest ages. Its production is not at all keeping pace with the new discoveries of gold. The richest silver mines in the world are those of Mexico, the estimated annual yield of which is about 1,600,000 lbs. troy of the pure metal. Peru is next in importance, but its produce is not more than a fifth or a sixth that of Mexico. Chili and Bolivia have also considerable silver mines. North America, with the exception of Mexico, has hitherto furnished only a small quantity; but a series of rich silver ores from California was shewn in the last great Exhibition (1862) in London, which were said to be obtained from veins so extensive as to encourage the hope of its silver mines becoming scarcely less famous than its gold-bearing alluvial deposits. The total silver produce of North and South America is a little over 2,000,000 lbs. troy annually.

Of European countries, Spain is the most productive in silver. In the district of Guadalaxara, some new mines were opened a few years ago, which have already reached a degree of prosperity quite extraordinary, the vein upon which they are placed containing, curiously enough, large quantities of a silver ore, called freislebenite (a compound of sulphur, antimony, lead, and silver), which has been hitherto looked upon as a very rare natural substance. Next to Spain, Austria, Saxony, and the Harz district in Northern Germany, yield the largest supplies. The silver mines of Kongsberg in Norway are likewise valuable, and have been long famous. Great Britain has no silver mines, properly so called, of any extent; but since the introduction in 1829 of Pattinson's process for the desilverising of lead smelted from argentiferous galena, a large quantity has been annually obtained in this way, the produce in 1864 being 641,088 ounces. (See Lead.) In the mineral veins of Cornwall, some 'bunches' of true silver ores have recently been found, but of limited extent.

The forms in which silver is found in nature are numerous, but we need only notice a few of them. It is frequently found native in crystallised and amorphous masses, which are sometimes of considerable size. One fine piece found at Kongsberg is

* Brande gives the following directions for preparing marking ink: Dissolve two drachms of nitrate of silver and one drachm of gum-arabic in seven drachms of water, and colour the liquid with Indian ink. The cloth must be first prepared by moistening the spot with a few drops of a soda solution, prepared by dissolving two ounces of crystallised carbonate of soda and two drachms of gum in four ounces of water. Professor Miller recommends, as a cheap indelible marking ink, a solution of coal-tar in naphtha; it resists the action of chlorine, and is used by bleachers to mark their goods.

now in the Copenhagen Museum, and weighs 500 lbs. But the quantity of silver found in nature in the metallic state is comparatively small. Its principal ores are the different sulphurets—viz., silver glance, or sulphuret of silver, containing when pure 87 parts of silver and 13 of sulphur; brittle silver ore, or sulphuret of silver and antimony, of which the composition is, silver 68·5, antimony 14·7, and sulphur 16·4; and red silver ore, called also ruby silver, of which there is a dark and a light kind, the composition of the former being similar to brittle silver ore, but it is a little less rich in silver, and the latter only differs in containing arsenic instead of antimony. The bulk of the silver obtained in Mexico and South America is got from these ores. The only other of much importance, except the mixed ores to be presently noticed, is horn silver, or chloride of silver. In a pure state, it consists of silver 75, and chlorine 25. It occurs extensively in Mexico and Peru, but is not common in European mines.

Besides the ores named above, a good deal of the silver of commerce is obtained from mixed ores, that is, the ores of other metals are frequently found to contain it. In many cases, the amount of silver falls greatly short of 1 per cent. These ores are for the most part sulphurets of tin, arsenic, copper, iron, and lead.

In the reduction of silver ores, the processes followed are based upon the fact, that both lead and mercury have a strong affinity for silver. A more recent process depends upon the solubility of chloride of silver in a hot solution of common salt, and its separation again on cooling.

The simplest process is ordinary smelting, and is only applied to the richest ores. These are crushed, mixed with old slag, lead in some form, and a little iron ore and lime. The mixture is then heated in a furnace with charcoal, which brings down the silver and lead together as an alloy. The silver is afterwards easily separated by cupellation, the principle of which is described in the article ASSAY; but on the large scale, instead of a small bone ash cupel, a cupellation furnace, say 6 feet in diameter, is used, of which fig. 1 is a section. Here

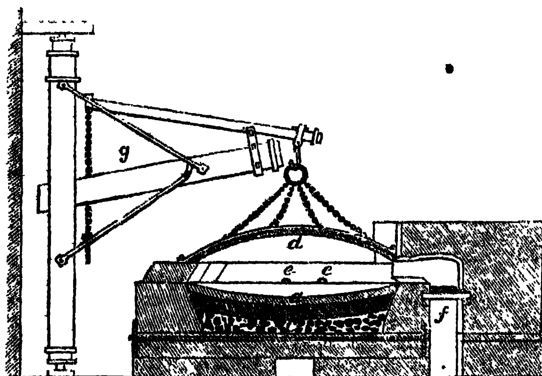


Fig. 1.—Silver Cupellation Furnace.
a, sole formed of wood ashes; *b*, bricks; *c*, bed of slag; *d*, dome of iron plate; *ee*, tuyères for bellows; *f*, fireplace; *g*, crane for lifting dome.

the alloy is melted, bellows are used to remove the lead as litharge, or oxide of lead, and a cake of silver is left on the cupel forming the bottom of the furnace.

It happens that not many even of the richer ores are pure enough to be treated with advantage by simply roasting them with lead; accordingly, another plan, called the amalgamation process, is more commonly adopted. The following is an outline of the way in which this is practised at Freiberg in Saxony. Ore consisting chiefly of silica, with but little lead, copper, &c. as sulphurets, and only from 3 to 3½ oz. of silver per cwt., is ground to powder by machinery, described under METALLURGY; but a large proportion of sulphuret of iron is also present, or must be added. About 10 per cent. of common salt is then mixed with the ore, and the mixture heated in a

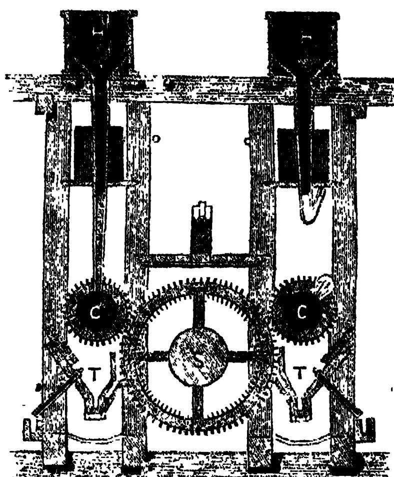


Fig. 2.—Vertical Section of Amalgamating Apparatus.
CC, oak barrels; S, toothed wheel for setting barrels in motion; H, hoppers with hose for passing the mixed ore into the barrels; TT, troughs for the reception of the charge when the amalgamation is complete.

Reverberatory Furnace (q. v.) to a temperature sufficient to expel water, and in part arsenic, zinc, and antimony. After two hours, the sulphur of the sulphurets takes fire, and is burned off as sulphurous acid, or converted into sulphuric acid, so that the metals become oxides and sulphates. The temperature of the furnace is now raised, when the chlorine of the common salt forms volatile chlorides with zinc, antimony, and iron, and a fixed chloride with silver. During the roasting, the contents of the furnace are continually stirred, so that they ultimately form a coarse powder.

The product of the roasting furnace, after being ground to a fine powder, is mixed in the proportion of 10 cwt. with 3 cwt. of water and 1 cwt. of iron in fragments; the mixture being effected in oak casks made to revolve on their axes. See figs. 2 and 3. This operation lasts two hours, and effects the solution of the sulphates and common salt; and the reduction of the chloride of iron and the chloride of copper to subchlorides—a change required in order to prevent the formation of subchloride of mercury in the next stage, which would be lost, and so cause a waste of quicksilver. Next follows the principal part of the process, the mercurialising. Quicksilver to the amount of 20 cwt. is made to run into each of the casks, which are then set in motion, and continue for 22 hours at the rate of 12 revolutions per minute. The result of this is the reduction of the chloride of silver in presence of the metallic mercury, with which the silver forms an amalgam.

In order to separate the amalgam from the earthy

matters and the sulphates and chlorides, the barrels, which were hitherto only two-thirds full, are now filled with water (the dilution throwing down any chloride of silver held in solution by the sea-salt), and kept revolving for two hours; after which, by

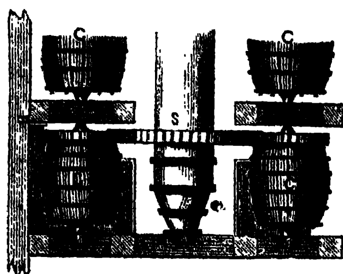


Fig. 3.—Plan of Part of Amalgamating Apparatus.

means of a stop-cock, the amalgam is allowed to flow into the amalgam chamber, and the rest of the contents, except the iron fragments, into a wash-tun. The superfluous quicksilver has next to be separated from the amalgam. This is done in bags of ticking, through which the mercury at first flows readily by its own weight, and is afterwards squeezed out on a flat surface. The result of this operation is, that the amalgam of mercury, silver, copper, &c. is left in the bags: its actual composition being nearly 85 per cent. of mercury, 10 per cent. of silver, and 5 of copper, lead, and antimony. Finally, the quicksilver of the amalgam itself is separated by heat in the distilling furnace, fig. 4. Here the

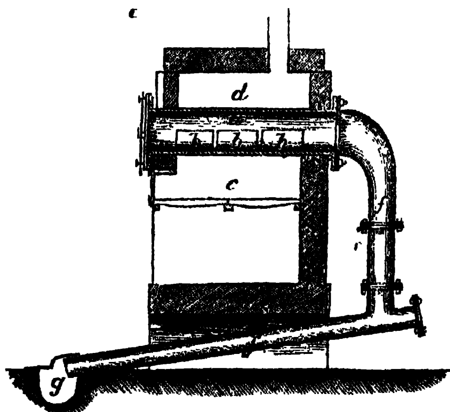


Fig. 4.—Furnace for Distilling the Amalgam.
a, iron retort; *b*, iron pots; *c*, fireplace; *d*, flue; *f*, condensing pipe; *g*, trough for collecting mercury.

amalgam is put into a row of iron pots, which go into a large retort. When heat is applied, the quicksilver volatilises, and is condensed in a pipe attached to the retort, from which it is collected in a trough. The impure silver left in the retort is refined by fusion and subsequent cupellation.

There is another process carried on at Freiberg and elsewhere, by which the use of mercury is dispensed with. It consists in treating the ore as above described till it leaves the roasting-furnace. At this stage, the roasted ore is digested in a warm concentrated solution of sea-salt, which readily dissolves the chloride of silver. On diluting the solution, and allowing it to cool, the chloride of silver will separate again, and could thus be obtained as a compound of comparative purity. But it is found preferable, instead of diluting the liquid, to introduce metallic copper, which has the property of decomposing the chloride of silver: the chlorine unites with the copper to form chloride of copper, and the silver is precipitated.

In Mexico, the extraction of the silver from its ores is chiefly accomplished by amalgamation, but the plan employed differs a good deal from the Saxon process described above, and is more primitive and wasteful, owing to the formation of subchloride of mercury. It is estimated that as much as 6,000,000 cwt. of quicksilver has been lost in this way at the American mines in the course of 200 years.

It has now become a common practice at Swansea, where the great British copper smelting-works are situated, to extract the silver which exists in an appreciable, though small quantity, in many copper ores. Several processes are followed, but it will suffice to name the liquation process. Blister-copper, that is, copper unrefined, which has been smelted from an argentiferous ore, is melted with three or four times its weight of lead, and cast into ingots. When these are moderately heated, the copper does not fuse, but the lead and silver melt, and run off together. The lead is then separated from the silver in the usual way by cupellation.

The physical and chemical properties of silver are such as make it specially valuable for many purposes in the arts; the chief of which are noticed in the articles Alloy, Mint, Plating, Galvanism, and Photography. Ordinary mirrors have their *silvering* produced by a coating of an amalgam of tin and mercury; but a process has for some years been practised, by which a mirror-like coating of silver is given to glass objects of any round as well as flat form. It consists in mixing some of the salts of silver, usually the nitrate, with an alcoholic solution of grape-sugar or of certain essential oils, which has the property of reducing the silver to the metallic state, and depositing it on the surface of the glass.

Medicinal uses of Silver. *Nitrate of silver*, in small doses, constitutes an excellent tonic, and it appears to exert almost a specific influence over certain convulsive diseases. As a tonic, it is frequently prescribed in the early stages of phthisis, and in cases of irritability of the mucous membrane of the stomach; and epilepsy and chorea frequently yield to its influence, when many other remedies have been tried in vain. There is unfortunately one great drawback to its administration—viz., that when its use has been continued for some time, this salt communicates a permanent slate-like or bluish-gray hue to the skin. There is very little danger of this change of colour occurring, if the medicine is not administered for a longer period than three months. In prescribing this salt, it is usual to begin with a small dose, about one-sixth of a grain, and gradually to increase it to two or three grains, three times a day. It is best administered in pills made with some vegetable extract. The surgical uses of nitrate of silver have been already noticed in the article on Lunar Caustic.

Oxide of silver is employed in the same cases as the nitrate. It is especially recommended in chronic affections of the stomach, and in menorrhagia. It may be given in the same doses as nitrate. *Chloride of silver* has been employed both in America and in Germany in the same cases as the nitrate, and in certain forms of syphilitic disease. It is stated not to produce the discoloration of the skin caused by the nitrate; but as the same statement was confidently made regarding the oxide, and was found to be fallacious, we are not inclined to put any faith in this assertion especially as the nitrate must be

at once converted into a chloride by the free hydrochloric acid of the gastric juice.

SILVERING GLASS. See MIRROR.

SIMARUBA'CEÆ, a natural order of exogenous plants, consisting of trees and shrubs; with alternate, generally compound leaves, without stipules; regular, generally hermaphrodite flowers. The species are not numerous; they are found in the tropical parts of Asia, Africa, and America. The whole order is characterised by great bitterness. Quassia (q. v.) and Bitterwood (q. v.) belong to it. The seeds of *Simaba cedron*, a small tree found in the Isthmus of Darien and neighbouring countries, are known by the name of *Cedron*, are intensely bitter, and are greatly esteemed in Central America and New Granada as a cure for intermittents, dyspepsia, and other diseases.—SIMARUBA BARK, employed as a tonic in dyspepsia, dysentery, &c., is the bark of the roots of *Simaruba amara*, a native of the West Indies, called *Mountain Damson* in Jamaica. It was first brought to Europe in 1713.

SIMBI'RSK, a government of Russia, bounded on the E. by the Volga, and on the W. by the governments of Nijni-Novgorod and Penza. Area, 18,778 sq. m.; pop. 1,183,312. The surface is for the most part level, and the soil of remarkable fertility, and there are excellent and extensive meadows and pasture-grounds. The fisheries and the commerce on the Volga, and cattle-breeding, are important.

SIMBIRSK, capital of the Russian government of the same name, on the right bank of the Volga, 220 miles south-east of Nijni-Novgorod. Leather, soap, and candles are manufactured, considerable trade is carried on by the Volga, and there is a famous annual fair. During the years 1864 and 1865, S. suffered severely from fires. Pop. 24,494.

SIMEON, REV. CHARLES, an eminent evangelical preacher of the English Church, was born at Reading in Berkshire, September 24, 1758. Educated at Eton and Cambridge, he was ordained a priest in 1782. His first religious impressions occurred during his residence at the university, and produced a permanent change in his character. From being a somewhat vain and dressy young gentleman, he passed into an ardent and zealous preacher of the Cross, and this he remained during the fifty-four years of his public ministry. His career was not marked by many incidents. Appointed vicar of Trinity Church, Cambridge, in the year of his ordination, and vice-provost of his own college (King's) in 1790, he continued to hold these offices to the close of his life, November 13, 1836. As a preacher S. was distinguished for an impassioned evangelicalism in language, sentiment, and doctrine, that at first roused against him a bitter and protracted opposition. His earnestness, however, met with its due reward. Friends and followers sprung up; and in course of time, S. became a centre of evangelical influence, that began to spread itself over the whole church, and gave birth to its great missionary activity in recent years. S. may even be regarded as the founder of the 'Low-church' party, and on the whole, fairly represents their earnestness, dogmatism, mediocre intellect, and limited scholarship. For an account of S.'s life and labours, see *Memoirs of the Rev. Charles Simeon*, by the Rev. W. Carus (Lond. 1857). S.'s *Horæ Homileticæ* (21 vols., 1832) are very popular among sermon readers and sermon-makers of evangelical tendencies.

SI'MEON STYLI'TES. See PILLAR-SAINTS.

SIMFERO'POL, a town of Russia, in the Crimea, capital of the government of Taurida, stands on the Salghir, 45 miles north-east of Sebastopol. The valley of the river is studded with charming villas, and the town is surrounded by gardens, and has a picturesque appearance. The older part comprises the old Tartar town of Ak-Metchet, or White Mosque—the new part, containing the government buildings, is very handsome. Fruits are largely grown in the vicinity, and exported. Pop. 29,812.

SI'MIA AND SIMI'ADÆ. See MONKEY.

SIMILAR FIGURES, in Geometry, are figures which exactly correspond in shape, but may or may not be of the same size. If the figures be rectilineal, then the criterion of similarity is that every pair of corresponding sides should have the same ratio to each other, and that each angle of the one figure should be equal to a corresponding angle of the other. If the figures be triangular, the proportionality of the sides carries with it the equality of the angles, and *vice versâ*, but only in this case. *Similar segments* of circles are those in which, and on whose bases, similar triangles can be inscribed; or, as it is otherwise expressed, those which contain equal angles—a satisfactory test that they are each the same part of their respective circles. *Similar solids* are those which are bounded by similar planes similarly situated to each other. All similar plane figures are to one another as the squares of any corresponding sides, and all similar solids are as the cubes of their corresponding sides. Thus, a circle which has 3 (3 : 1) times the diameter of another, has 9 ($3^2 : 1^2$) times its area, and a globe which has 3 (3 : 1) times the diameter of another has 27 ($3^3 : 1^3$) times the volume.

SI'MLA, a British sanatorium, in the north-west of India, about 170 miles in direct line north of Delhi. It consists of a number of houses irregularly scattered over a mountain-ridge, with a noble panorama expanding on all sides of it. European fruits and vegetables are successfully and extensively cultivated, and the climate is salubrious. The pop., which is very fluctuating, is said to range from 2000 to 20,000.

SIMO'DA (Lowland), a harbour of Japan, at the southern extremity of Cape Idzu, and about 80 miles from Yeddo, opened to foreign commerce by the Dutch treaty of 1857. The streets of the town are about 20 feet wide, and at right angles. The pop. is estimated at 80,000. In 1854, the town was nearly destroyed by an earthquake, while the harbour was so scoured out that hardly any holding-ground was left for ships on the granite bottom.

SIMON, RICHARD, a distinguished orientalist and critical scholar, was born at Dieppe, May 13, 1638. Having completed his studies, he entered the Congregation of the Oratory in 1659, but soon afterwards withdrew. He returned, however, in the latter part of 1662. For a time, he delivered lectures on Philosophy in the college of Juilly; but his studies eventually turned upon theology, oriental languages, and biblical criticism. At one time, he thought of entering the Jesuit order, but he remained in the Oratory; and it was while still a member of that congregation that he published his well-known work on the doctrine of the Oriental church regarding the Eucharist, designed as a supplement to the celebrated *Defence of the Perpetuity of the Faith in the Blessed Eucharist*, by Arnauld and Nicole, but criticising that work very severely. This and other controversies to which his later writings gave rise, led to his again withdrawing from the Oratory in 1678. In that year he retired to Belleville, as curé; but in 1682, he resigned his parish, and lived in literary retirement, first at Dieppe, and afterwards in Paris. His health having given way, he returned once again to his native place,

Dieppe, where he died in April 1712. Few writers of his age played so prominent a part in the world of letters, and especially in its polemics. There is hardly a critical or theological scholar among his contemporaries with whom he did not break a lance—Spanheim, Le Clerc, Du Pin, Jurieu, and Jurieu's great antagonist, Bossuet. The principal work of S. is his *Histoire Critique du Vieux Testament* (Paris, 1678), in which he anticipates the most important conclusions of all the later rationalistic scholars of Germany, and also their method of investigation. For example, he conceives himself to have disproved the Mosaic authorship of the Pentateuch, and assigns its composition to the scribes of the time of Ezra. Other writings of S.'s are *Histoire Critique du Texte du Nouveau Testament* (Rotterd. 1689); *Disquisitiones Criticæ de variis Bibliorum Editionibus* (1684); *De l'Inspiration des Livres Sacrés* (Rotterd. 1687); and *L'Histoire Critique des Principeaux Commentateurs du Nouveau Testament* (Rotterd. 1692), in which he assails the theology of the Fathers, and particularly that of Augustine, as a departure from the simple and less rigid doctrines of the primitive church. Among the Fathers, his most esteemed authority was Chrysostom. Bossuet replied to this last work by his *Défense de la Tradition et des Saints Pères*. S. frequently published under assumed names—as his *Dissertation Critique* on Dupin's *Library of Ecclesiastical Writers*, under the name of Jean Reuchlin; a work, *Histoire Critique sur la Créance et des Coutumes des Nations du Levant*, under the anagram of Monis; and a *Histoire de l'Origine et du Progrès des Revenus Ecclésiastiques* under the name of Jerome Acosta. No collected edition of his works has ever appeared; in the natural progress of the science of criticism, the most famous of them have lost most of their prestige, and are displaced by recent, and often second-hand compilations upon the subjects, which, in the days of S., were comparatively new and unexplored; but still there is much to be learned even from such of his works as have been forgotten by ordinary students.

SIMO'NIDÈS, a celebrated Greek lyric poet, was born at Iulis, in the island of Ceos, in the year 556 B.C., and educated probably with a view to making music and poetry a profession. He left his native island on the invitation of Hipparchus, who, by means of great rewards, induced him to reside at Athens, where also lived at that time Anacreon and Lasus, the teacher of Pindar, although no intimacy seems to have sprung up between S. and his two rivals. It was probably after the expulsion of Hippias (510 B.C.) that he took up his residence in Thessaly, under the patronage of the Alcuads and Scopads, who appear to have treated him in a very niggardly fashion. Shortly before the invasion of Greece by the Persians, he returned to Athens, and employed his poetic powers in the composition of elegies, epigrams, dirges, &c., in connection with that momentous struggle, taking the prize, in regard to the battle of Marathon, out of the hands of his rival Æschylus. In the year 477 B.C., when S. was 80 years of age, he came off victor for the 56th time in a poetical contest at Athens. Shortly after this, he went to reside at the court of Hiero of Syracuse, where he died in 467 B.C., at the age of 90. S. appears to have scandalised his contemporaries by writing for hire; and Pindar, his great rival, accuses him, apparently not without good reason, of excessive avarice. His poetry is imbued with a comparatively high morality. He brought to perfection the elegy and epigram, and excelled in the dithyramb and triumphal ode; he seems also to have completed the Greek alphabet by the addition of the double letters and long vowels, and to have invented the art of artificial memory. The characteristics of his poetry are sweetness, polish combined with simplicity, genuine pathos, and great power of expression, although in originality he is much inferior to his contemporary Pindar. The best edition of his fragments is that of Schneidewin, entitled *Simonidis Cei Carminum Reliquiæ* (Brunswick, 1835).

This S. must be carefully distinguished from the iambic poet SIMONIDES of Amorgos, who flourished about 100 years previous to S. of Ceos.

SIMONOSE'KI, a town of Japan, in 33° 56′ N. lat., and 131° E. long., at the south-west extremity of the island of Nipon, and at the entrance of the inland sea Suonada. It is surrounded by hills, and consists of one main street, containing about 10,000 inhabitants. The warehouses—the principal buildings—are built of mud and wood, coated with cement, and are said to be fireproof. S. is a depôt for receiving the European imports from Nagasaki, to be sent into the interior of the country; also for the produce from Osaca, which is reshipped to Nagasaki and other places.

SI'MONY, in English Law, is the corrupt presentation of any one to an ecclesiastical benefice for gift-money or reward, and is so called from its resemblance to the sin of Simon Magus. In the canon law, it was considered a heinous crime, and a kind of heresy. As the canonical punishment, however, was not deemed sufficient, a statute was passed in the time of Elizabeth, defining its punishment. A simoniacal presentation was declared to be utterly void, and the person giving or taking the gift or reward forfeited double the value of one year's profit; and the person accepting the benefice was disabled from ever holding the same benefice. Presentation bonds, however, taken by a patron from a presentee to resign the benefice at a future period in favour of some one to be named by the patron, are not illegal, provided the nominee is either by blood or marriage an uncle, son, grandson, brother, nephew, or grandnephew of the patron, and provided the bond is registered for public inspection in the diocese. The result of the statutes is that it is not simony for a layman or spiritual person, not purchasing for himself, to purchase while the church is full, either an advowson or next presentation, however immediate may be the prospect of a vacancy, unless that vacancy is to be occasioned by some agreement or arrangement between the parties. Nor is it simony for a spiritual person to purchase for himself an advowson, although under similar circumstances. It is, however, simony for any person to purchase the next presentation while the church is vacant; and it is simony for a spiritual person to purchase for himself the next presentation, although the church be full.

SIMOO'M (otherwise written Simoun, Semoun, Samoun, Samūn), or Sambuli, a name derived from the Arabic *samma*, signifying hot, poisonous, or generally whatever is disagreeable or dangerous, and applied to the hot suffocating winds which are peculiar to the hot sandy deserts of Africa and Western Asia. In Egypt, it is called *khamsin* (Ar., fifty) because it generally continues to blow for 50 days, from the end of April to the time of the inundation of the Nile.

Owing to the great power of the sun's rays, the extreme dryness of the air, and the small conducting power of sand causing the accumulation of heat on the surface, the superficial layers of sand in the deserts of Africa and Arabia often become heated to 200° F. to a depth of several inches. The air resting on this hot sand becomes also highly heated,

thus giving rise to ascending currents; air consequently flows towards these heated places from all sides, and these different currents meeting, cyclones or whirling masses of air are formed, which are swept onward by the wind prevailing at the time. Since the temperature, originally high, is still further raised by the heated grains of sand with which the air is loaded, it rapidly increases to a degree almost intolerable. In the shade, it was observed by Burckhardt in 1813 to have risen to 122°; and by the British Embassy to Abyssinia in 1841 to 126°. It is to the parching dryness of this wind, its glowing heat (about 200°), and its choking dust, and not to any poisonous qualities it possesses, that its destructive effects on animal life are to be ascribed.

The approach of the Simoom is first indicated by a thin haze along the horizon, which rapidly becomes denser, and quickly overspreads the whole sky. Fierce gusts of wind follow, accompanied with clouds of red and burning sand, which often present the appearance of huge columns of dust whirling forward; and vast mounds of sand are transported from place to place by the terrible energy of the tempest. By these mounds of sand, large caravans are frequently destroyed; and even great armies have been overwhelmed by them, as in the case of Cambyses, who was overtaken by the Simoom on his march through the desert to pillage the temple of Jupiter Ammon, and perished with 50,000 of his troops. The destruction of Sennacherib's army is supposed to have been caused by the Simoom. The Simoom generally lasts from 6 to 12 hours, but sometimes for a longer period.

The effects of this wind are felt in neighbouring regions, where it is known under different names, and it is subject to important modifications by the nature of the earth's surface over which it passes. In Italy, it is called the *Sirocco*, which blows occasionally over Sicily, South Italy, and adjoining districts. It is a hot moist wind, receiving its heat from the Sahara, and acquiring its moisture in its passage northward over the Mediterranean. It is the plague of the Two Sicilies, and while it lasts a haze obscures the atmosphere, and so great is the fatigue which it occasions that the streets of Palermo become quite deserted. The Sirocco sometimes extends to the shores of the Black and Caspian Seas, and under its blighting touch, sheep and cattle die in the steppes beyond the Volga, and vegetation is withered and dried up. It is called the *Samiel* in Turkey, from its reputed poisonous qualities.—The *Solano* of Spain is a south-east wind, extremely hot, and loaded with fine dust, which prevails at certain seasons in the plains of Mancha and Andalusia, particularly at Seville and Cadiz. It produces giddiness, and heats the blood to an unusual degree, causing general uneasiness and irritation; hence, the Spanish proverb: 'Ask no favour during the Solano.'—The Harmattan (q. v.) of Guinea and Senegambia belongs to the same class of winds.

SIMPLE CONTRACT, in English law, means any contract which is constituted by word of mouth or by a writing not under seal. See CONTRACT.

SI'MPLON (Ital. *Sempione*), a famous mountain of Switzerland, one of the Lepontine Alps, in the east of the canton of Valais, and near the Piedmontese frontier, rises to the height of 11,124 feet. The *Simplon Road*, one of the greatest engineering achievements of modern times, leads over a shoulder of the mountain from which it derives its name (the *Pass of the Simplon*, 6592 feet) from Brieg in Valais to Domo d'Ossolo in the north of Piedmont. The road was commenced in 1800 under the direction of Napoleon, and was completed in 1806. It is from 25 to 30 feet broad, and has nowhere a slope greater than 1 in 13. It is carried across 611 bridges, over numerous galleries cut out of the natural rock, or built of solid masonry, and through great tunnels. Close to the highest point is the *New Hospice*, one of the 20 edifices on this route for the shelter of travellers. It was greatly damaged by storms in the years 1834, 1839, and 1850.

SIMROCK, KARL, a German poet and scholar, who has done more perhaps than any other man to make his countrymen familiar with their early literature, was born at Bonn, 28th August 1802. He studied at the university of his native city and afterwards at Berlin, and in 1823 entered the Prussian state service. His first work was a translation into Modern German of the *Nibelungenlied* (Berl. 1827; 9th ed. Stuttg. and Tüb. 1854), followed by a translation of the songs admitted by Lachmann to be genuine, under the title *Zwanzig Lieder von den Nibelungen* (Bonn, 1840). Soon after the publication of his translation of Hartmann von der Aue's *Armer Heinrich* (Berl. 1830), he was compelled to leave the Prussian service on account of a revolutionary poem which he wrote. Since then he has devoted himself exclusively to literature, and more particularly to the early literature of his own country, which he has modernised in splendid style. In 1850, he was appointed professor of German Language and Literature at Bonn, a situation which he still holds. His principal works, besides those already mentioned, are: *Quellen des Shakspeare in Novellen, Märchen, und Sagen* ('Sources of Shakspeare in Novels, Tales, and Legends,' 3 vols. Berl. 1831), executed in conjunction with Echtermeyer and Henschel, but of which the most important part was S.'s; *Novellenschatz der Italiener* (Berl. 1832); a translation, with commentary, of the poems of Walther von der Vogelweide (2 vols. Berl. 1833) in conjunction with Wackernagel; and of *Wieland der Schmied. Deutsch Heldensage* (Bonn, 1835), one of the freshest of the German medieval epics; *Rheinsagen aus dem Munde des Volkes und Deutscher Dichter, fur Schule, Haus, und Wanderschaft* ('Legends of the Rhine, from the mouth of the people and German poets, for School, Home, and Travelling,' 4th ed. Bonn, 1850, latest ed. 1857); a collection of German *Volksbücher* ('People's Books'), of which 36 had appeared by the year 1854, and which are still going on, comprising national proverbs, songs, and riddles, besides a vast quantity of stories; a translation of Wolfram von Eschenbach's *Parzival und Titurel* (Stuttg. and Tüb. 1842); and *Das Helden buch*, partly translations and partly original poems (1843—1849), illustrative of the heroic traditions of the Teutonic race. A separate collection of his own poems (*Gedichte*) was published at Leipzig (1844, new ed. 1863). Later productions are a translation of the Songs of the Edda (Stuttg. and Tüb. 1851, 3d ed. 1863). A *Handbuch der Deutschen Mythologie* (2 vols. Bonn, 1853—1855, 2d ed. 1864), and an *Altdeutsches Lesebuch in Neudeutscher Sprache* (Stuttg. and Tüb. 1854); *Das Deutsche Kinderbuch, Reime, Lieder, &c.* (1856—1857); *Der Wartburg Krieg, herausgegeben, geordnet, übersetzt, und erläutert* (1858); *Die Nibelungenstrophe und ihr Ursprung; Beitrag zur Deutschen Metrik* (1858); *Lieder vom Deutschen Vaterlande* (1863); *Deutsche Märchen* (1864).

SIMSON, ROBERT, a celebrated Scotch mathematician, was born at Kirton Hall in Ayrshire, October 1687. He was educated at the university of Glasgow with a view to the clerical profession, and attained great eminence in classical and mathematical knowledge. His taste for mathematics gradually gained the ascendency, and all other

pursuits were abandoned. After a brief residence in London, during which he made the acquaintance of Dr Halley, Mr Ditton, and others, he returned to Glasgow, where in 1711 he was appointed Professor of Mathematics, and for 50 years discharged his professorial duties. S.'s reputation rests chiefly on his 'restorations,' or, as they might more properly be called, 'reconstructions,' of the Greek geometers. Some good judges are of opinion that he has corrected many errors in the original text, though his respect for the Greek mathematicians always led him to refer these to the ignorance of editors, and the negligence of copyists. His first attempt in this direction was to discover the signification of Euclid's porisms, the only datum being a most obscure and tantalising description of them by Pappus, the indefiniteness of which had foiled both Fermat and Halley. In this difficult task, S., however, succeeded: and a similar attempt, attended with similar success, on the 'loci plani' and the 'sectio determinata' of Apollonius, stamped him as one of the most elegant geometers of modern times. With the thorough insight which he had thus obtained into the nature and processes of the Greek analysis, he set himself to the correction of Euclid's *Elements*. This last work was published in 1758, and has deservedly enjoyed a high character; it has been frequently re-edited and republished as a school-book, especially the edition by Playfair. S. also published along with his edition of 'Euclid,' a list of Euclid's 'Data,' of which he subsequently issued a second edition; but of his other works, some of which were almost ready for publication, none were printed till after his death. He retired from his professorship in 1761, and employed himself chiefly in the correction of his various works till his death, October 1, 1768. Eight years after S.'s death, Earl Stanhope caused to be published (for private circulation) at his own expense, the work on Porisms, the two restored works of Apollonius, a posthumous tract on Ratios, and another on Logarithms; and an edition of Pappus, which was discovered after S.'s death, was presented to the university of Oxford.

SIN is the name given by theologians to the evil of human nature, to the moral defect or perversion which appears an inherent quality of the human will, and in a greater or less degree unavoidably characterises it in this life. It is something more than evil as affirmed of the external world or of the lower creation. *Evil*, as denoting decay or corruption in nature, is admittedly a mere relative term, for in truth decay is just as normal a process of creation as renovation, and corruption is the condition of restored health and beauty. In a similar manner, evil such as it exists in the lower animal creation, in the form of *prey* and in the forms of pain, of sickness, and of death—whatever be the special view taken of such phenomena—is never reckoned evil in the sense of *Sin*. In order to constitute the special idea of sin, it is always necessary to suppose a *moral* element in the evil to which it is applied. Whatever form of evil is independent of the human will as its source, origin or agent, is not sin. Theologians, indeed, speak of original sin, or the sin of human nature, as distinguished from actual sin, or the particular transgression of the individuals composing mankind. According to a common theological view, men are not only sinners individually, but they are partakers of a sinful nature, with which their will has had nothing to do—with reference to which they have had no choice of good or evil. The evil has come to them by natural descent from the original parents of the race. But even the most extreme view of original sin preserves a hypothetical relation between every individual will and the primal transgression which it considers to be sin, not merely in those who committed it, but in those who have descended from them. All mankind are supposed to have been in Adam, the first sinner, as their representative, so that 'they sinned in him and fell with him in his first transgression.' Without such a hypothesis of unity between Adam and his race, so that his will was in some measure the typical or representative will of the race, the notion of original sin could not be maintained. For the relation between sin and will as a moral power, having the choice of good and evil, is a cardinal relation without which it would seem impossible to distinguish sin as a quality from other forms of evil in the world.

SI'NAI, the mount on which, according to the Pentateuch, God announced to Moses the ten commandments and the other laws by which the Israelites were to be bound. Its exact position is matter of dispute among travellers, but it is to be sought for in the mass of granite and porphyry mountains occupying the greater part of the Arabian peninsula, lying between the Gulf of Suez and Akabah, and rising to a height of 8000 or 9000 feet above the sea. This mountain-mass is divisible into three groups: a north-western, reaching, in Mount Serbal, an elevation of 6340 feet; an eastern and central, attaining, in Jebel Katherin, a height of 8160 feet; and a south-eastern, whose highest peak, Um Shaumer, is the culminating point of the whole Sinaitic range. Serbal, with its five peaks, looks the most magnificent mountain in the peninsula, and is identified with S. by the earlier Church Fathers, Eusebius, Jerome, Cosmas, &c.; but it does not meet the requirements of the Hebrew narrative, and even as early as the time of Justinian, the opinion that Serbal was the S. of Moses had been abandoned, and to a ridge of the second or eastern range that honour had been transferred, the northern summit of which is termed Horeb; and the southern, Jebel-Mûsa, or Mount of Moses, continues to be regarded by the great majority of scholars as the true Sinai. Its height is variously estimated at from 6800 to 7100 feet above the sea.

At the eastern base of Jebel-Mûsa, in the ravine of Shouaib, stands in solitary peace the famous monastery of Mount S.; but in earlier times the mountain had numerous other convents, chapels, and hermitages.

SINA'PIS. See MUSTARD.

SINCLAIR, THE FAMILY OF. The Scottish historical House of Sinclair or St Clair is of Norman descent, the surname (Latinised *De Sancto Claro*) being doubtless derived from possessions in Normandy. Two families bearing this surname, whose connection cannot now be traced, the St Clairs of Rosslyn and of Herdmanston, appear in Mid-Lothian and East Lothian in the beginning of the 12th century. Henry St Clair, *Vicecomes* of Richard Morville, Chancellor of Scotland, obtained, in 1162, a charter of the lands of Herdmanston, which have ever since continued in the family. His descendant rendered signal service to Robert Bruce, for which he is said to have presented him with a sword, still in the possession of the family, with the words inscribed: 'Le roy me donne, St Clair me porte.' The ancestor of the other line was William St Clair, who had Rosslyn confirmed to him by charter from David I. His descendant was, like his contemporary of the Herdmanston line, a companion-in-arms of Robert I., on whose death Sir William St Clair of Rosslyn was one of the knights selected to accompany the good Sir James Douglas, with the heart of his sovereign, to Jerusalem. With the Douglas, he fell in battle against the Moors in 1330.

But the fortunes and importance of the family were principally due to the marriage of the son of this Sir William with the daughter of Malise, Earl of Strathearn, Caithness, and Orkney, and heiress of the Norwegian Jarls of the Orkneys. In this way the St Clair family acquired the Earldom of Orkney, coupled with some very stringent conditions of fealty to the king of Norway, which would have rendered it impossible for him, in the event of a war between the countries, to have retained both his Scotch and his Norse possessions. The Orkney earldom was, however, acknowledged and confirmed to him by Robert II.; and for the next two generations the power of the family continued to be little less than princely, the St Clair influence being further increased by intermarriages with near relatives of the royal house of Scotland. William, the third Earl, held the high offices of Lord Admiral, Lord Justice-general, Lord Chancellor, and Lord Warden of the three Marches. He was made Earl of Caithness in 1450. At his castle of Rosslyn he kept up an almost regal state and pomp. He founded and endowed a collegiate church there, bringing skilled workmen from foreign parts to build that rich and elaborate chapel, which is still among the architectural gems of Scotland, and in its style more resembles the churches of Spain than those of North Britain. His daughter was given in marriage to Alexander, Duke of Albany, son of James II. On the marriage of James III. with Princess Margaret of Denmark, the sovereignty of the Orkneys was made over by King Christiern in mortgage to the Scottish crown, a transaction which eventually led to the permanent cession of these islands. The earl soon after resigned into James's hands his earldom of Orkney, with the islands of Orkney and Shetland, and as a compensation—it has been said, a very inadequate one—obtained the lands of Dysart and Ravensheugh, and the castle of Ravenscraig in Fife. He was still Earl of Caithness and Lord Sinclair, and from the extent of his possessions one of the most powerful nobles in Scotland. Instead, however, of keeping these possessions united, he partitioned them among his three sons, in such a way as contributed far more than the loss of the Orkneys to break down the family influence. On William, his eldest son, he bestowed merely the lands of Newburgh, in Aberdeenshire; on his second, Sir Oliver, he settled all his estates south of the Tay: while, with consent of the crown, he conveyed the earldom of Caithness to his youngest son, also named William.

LORDS SINCLAIR.—The eldest son of this last Earl of Orkney endeavoured to set aside his father's settlement, by which he had been postponed to his younger brothers, and succeeded at last in effecting an arrangement by which Sir Oliver made over to him all the Fifeshire estates, while he renounced all claim to Rosslyn, and the other lands in the county of Edinburgh. He was still Lord Sinclair, and on his death, on the field of Flodden, he was succeeded by a line of Lords Sinclair, who ranked among the more considerable of the Scottish nobility. His grandson, by a daughter, was the notorious Earl of Bothwell, third husband of Queen Mary, and whom, in memory of his maternal descent, that unhappy queen created Duke of Orkney. The seventh Lord Sinclair had no male issue, but a daughter, married to St Clair of Herdmanston, the representative of the other House of Sinclair already alluded to. The son of this marriage, in virtue of a new patent obtained from Charles II., became eighth Lord Sinclair—this patent, singularly enough, bringing in, on failure of heirs male, his paternal relatives, the St Clairs of Herdmanston, strangers in blood to the former Lords Sinclair. The contingency provided for occurred in the next generation. The two sons of the eighth lord having died without issue, the title went to the Sinclairs of Herdmanston, who have ever since inherited it.

EARLS OF ROSSLYN.—Rosslyn had been purchased by one of the sons of the eighth Lord Sinclair from the last of Sir Oliver's line, and while the title thus went to an entirely different line, the estates, both of Rosslyn and Dysart, were carried by destination to the issue of the eighth lord's second daughter, whose grandson, Sir James Erskine of Alva, succeeded to the earldom of Rosslyn, which had first been conferred on his maternal uncle, the Lord Chancellor Loughborough.

SINCLAIRS OF ROSSLYN.—Sir Oliver, the above-mentioned second son of the last Earl of Orkney, was progenitor of a line of barons who, for two centuries, owned the splendid domains of Rosslyn, and were buried in the vault of the chapel, in royal fashion, in their armour. Sir Oliver's second son was the noted Oliver Sinclair, the favourite of James V., whom, to the general disgust, he placed in command of the army sent to encounter the English in 1542. To the repugnance of the army to serve under him, is attributed the disgraceful rout of Solway Moss, where 10,000 Scottish troops fled at the sight of 300 English cavalry, to whom they can hardly be said to have made any resistance. Among the functions discharged by the Sinclairs of Rosslyn were those of protectors of the gipsy race, and hereditary grand-masters of the Masonic fraternity of Scotland. The last of Sir Oliver's line, impoverished by the political troubles in which his support of the Stewarts had involved him, sold Rosslyn, which then became, as has been already seen, the property of the disinherited elder branch.

EARLS OF CAITHNESS.—This title was, as has been seen, conferred on William, the youngest son of the last Earl of Orkney, and has been ever since held by his descendants, passing repeatedly from one branch to another on the failure of the direct line. The third earl, ambitious enough to aspire to be an independent prince, endeavoured, in 1529, by force of arms, to recover the Orkneys from the crown. He was joined by his cousin, the second Lord Sinclair, but this foolish expedition met with a signal defeat. The support of the islanders had been calculated on: but the large majority of them turned out to be steady in their loyalty, and encountered the insurgents in a naval battle, in which the earl with 500 men were slain, and Lord Sinclair and the rest made prisoners. The sixth earl, having got into difficulties, conveyed his lands to his powerful creditor, Sir John Campbell of Glenurquhy, afterwards first Earl of Breadalbane, who, in 1677, got a patent creating him Earl of Caithness, and took possession of the Caithness estates. He was dispossessed, however, by George Sinclair, the heir-male, who entered Caithness with an armed force, and was eventually found to have the sole right to the title and estates. The Sinclairs of Ulbster are sprung from a legitimated son of William Sinclair, second son to the fourth Earl of Caithness, to whom the valuable and extensive lands of Ulbster were conveyed in 1596 and 1600 by the fifth earl. See SINCLAIR, SIR JOHN.

A genealogical history of the St Clairs of Rosslyn, written by Father R. A. Hay, was printed privately at Edinburgh in 1835.

SINCLAIR, SIR JOHN, an eminent agricultural improver, and patriotic Scottish gentleman, was born at Thurso Castle in 1754. He represented the Sinclairs of Ulbster, a branch of the noble House of Caithness. After a careful education, completed at Oxford, he studied law, and was admitted a member of both the Scottish and

English bars, but having, in his 16th year, succeeded to the family estate, he devoted himself to his duties as a northern landlord, and to the more engrossing pursuits of public life. In 1780, he was returned to parliament for his native county, which he represented for many years. He wrote pamphlets on public affairs—on the navy, the militia force, the national finances, &c. In 1784, he published a *History of the Revenue of the British Empire*, an elaborate work in two 4to vols.; and in 1786 he was created a baronet. He travelled over Europe, gathering information on economical and commercial questions, and on his return set about establishing a society in Scotland for improving the breeds of sheep and the quality of wool. His exertions also led to the formation of the Board of Agriculture in 1793, of which he was president for 13 years. This institution was the precursor of numerous agricultural associations, by which the country was greatly benefited. Sir John's most important undertaking was originating and carrying through the *Statistical Account of Scotland*, completed in the year 1798 in 20 large vols., and comprising a description of every parish in Scotland. The parochial clergy were the chief contributors, but the indefatigable baronet also employed statistical missionaries, and was for seven years actively engaged in prosecuting the work. Sir John wrote on all manner of topics, including even a tragedy and treatises on health and longevity; and his publications during 50 years of ceaseless exertion are said to amount in number to 367! Not one of the whole seems destined to live; their value perished in the using; but the long and active life of their author was highly beneficial to his country. The venerable baronet died at Edinburgh, December 21, 1835, in the 82d year of his age.

Sir John S. left a numerous family, some of whom have attained to distinction. CATHERINE SINCLAIR, fourth daughter of the deceased baronet, was the author of a number of tales and descriptive works—*Modern Accomplishments, Modern Society, Scotland and the Scotch, Shetland and the Shetlanders*, &c., which all evince literary taste and talent, combined with fine moral feeling; while her practical benevolence and social kindness greatly endeared her to her friends, and to Edinburgh society generally. Miss S. died, universally regretted, in 1864, aged 63.

SINDE, an extensive province of British India, lies in the extreme west of that territory, and is bounded on the N. by Beloochistan and the Punjab, E. by Rajputana, W. by Beloochistan, and S. by the Arabian Sea and the Great Western Runn, an extensive lacustrine inlet which separates S. from Cutch. It is 380 miles in greatest length, 280 in greatest breadth from east to west, contains 54,403 English sq. m., with a pop. (1859) of 1,795,594. The sea-coast, which extends north-west for 150 miles, is very low and flat, with the sole exception of the small portion beyond Karatchi (Kurrachi), and is studded here and there with low mud-banks formed by the Indus, or with sand-hills, the accumulated drift from the beach; it is overflowed at high-tide to a considerable distance inland, and is hardly visible, according to Burnes, at a league from shore. The province is traversed through its whole length by the Indus (q. v.), which, on approaching the coast, divides and subdivides into a number of channels, forming a delta of 75 miles in length by 130 in breadth. This delta, unlike that of the Ganges, is almost wholly destitute of wood, and the soil consists of a mixture of clay, sand, and vegetable mould, which is speedily baked hard by the heat. Along each bank of the Indus is an alluvial tract of great fertility, extending 2 to 12 miles from the river, and mostly irrigated by artificial canals and watercourses, which, overflowing during the inundations, cover the soil with a silt so rich as to yield two, and sometimes three, crops in a year. The soil, nevertheless, contains in the north so much saltpetre, and in the south so much salt, that after the year's crops have been obtained, these substances are extracted for home consumption and export. Between the Indus and its most easterly branch, the Narra, is an alluvial 'doab,' averaging 75 miles in width, but which, from want of irrigation, has become almost a desert. East of this, on the other side of the Narra, is the *Thur*, a desert of shifting sand. West of the Indus the country is occupied by the desert of Shikarpur on the north, a desert not of sand, but of alluvial clay, the same as that of the delta, which only requires irrigation to render it fertile; and in the south it is traversed by the Hala Mountains. The *Thur*, or eastern desert, has numerous vestiges of former towns, in the shape of heaps of fragments of bricks and pottery. The climate of S. is remarkably sultry and dry, it being completely beyond the action of the south-west monsoon; at Haidarabad, the fall of rain in one year was 2¼ inches, and the average annual fall at Karatchi does not exceed 6—8 inches, and Larkhana has been known to be destitute of rain for three years in succession; the average maximum heat for six months at Haidarabad was 98·5° in the shade, and is still greater in Upper Sinde. There are generally two harvests per annum: the first, or *rubbi* (spring) harvest, consists of wheat, barley, oil-seeds, millet, durra, opium, hemp, and tobacco; the second, or *kurif* (autumn) harvest, of those crops whose ripening requires much heat, as rice, sugar-cane, cotton, indigo, maize. The population consists of a mixture of Juts (a Hindu race) and Beluchis, with a few Afghans in the north-west; the greater portion of them are Mohammedans, and the remainder, who profess Hinduism, have fallen far from the strictness of observance which characterises the most of its followers. Generally, the Sindians are tall and handsome; the Beluchi portion of them warlike and independent; the Juts peaceable, and given to agricultural pursuits.

From the time (711) that S. was conquered by the calif, Abd-ul-Melek, it underwent numerous vicissitudes, forming at times a part of the empire of Delhi, and being latterly (1756) joined to Afghanistan. In 1779, the Beluchis rebelled, deposed their ruler, defeated the Afghans (1786), and raised their leader, the chief of the Talpûr tribe, to supreme power. This chief made large grants of territory to various of his relatives, reserving most of Lower S. for himself and his three brothers; so that there were four 'ameers' at Haidarabad, three at Khyerpûr, and one or two at Mirpur. The ameers of S. always regarded the British government with suspicion, and occasionally troubled those traders who visited their dominions; but they subsequently concluded commercial treaties, which were observed with punctuality. On the outbreak of the Afghan war in 1838, the British government intimated its intention to take temporary possession of Shikarpûr, and forced the ameers of Haidarabad and Mirpur to agree to a treaty which virtually destroyed their independence. Their expression of a natural dislike at the mode in which they had been treated, provoked fresh demands from the Calcutta government, to which the Haidarabad ameers agreed, despite the clamours and threats of their followers, who attacked the British residency on the following day. Sir Charles James Napier, the British envoy, at the head of a considerable military force, then marched against the enemy, totally routed them at Meeanee (17th February 1843), and by defeating the ameers of Mirpur, at Dubba, near Haidarabad (March 24th),

completed the subjugation of Sinde. The conquered territory was divided into three collectorates—Haidarabad, Karatchi, and Shikarpûr; the ameer of Khyerpûr, by continuing faithful to the British, retaining his dominions. For two years afterwards, Napier was actively employed in reducing the marauding tribes of the west, who pillaged the province; and so successful was the 'Sheitanka bhai' (Devil's Brother), as the robber tribes named him, that they were completely rooted out of their fastnesses, and most of them transported to distant regions. The country is reported as rapidly improving under its present administration.

SINDHU (from the Sanscrit *syand*, which in its older form probably was *syandh*, to trickle or flow) is the ancient name of the river Indus and the country along the Indus or Sindh.

SINDIA, the name of a powerful family of Mahratta chiefs and princes, which occupies a conspicuous place in the history of India during the 18th and 19th centuries. The founder of the family was RANOJEE SINDIA, a Sudra of the Kûmbi ('cultivator') tribe, who from a menial station in the household of the Peishwa, rose to a high rank in the body-guard, and after 1743, received in hereditary fief the half of the extensive province of Malwa. His son, MADHAJEE SINDIA (1750—1794), joined the Mahratta confederation, and was present at the battle of Paniput (1761), where he was so desperately injured as to be left for dead, but he speedily recovered, and on the retirement of the Afghans and their allies, repossessed himself of his hereditary dominions. On the death of Mulhar Rao Holkar (q. v.), he became the chief of the Mahratta princes, and had the command of the Peishwa's body-guard; and in 1770, the Peishwa and his two powerful feudatories, S. and Holkar, aided the emperor of Delhi in expelling the Sikhs from his territories, of which the administration was handed over to S., who was now by far the most powerful of the Mahratta chiefs. The murder of the young Peishwa by his uncle, Ragoba, and the consequent expulsion of the murderer from the throne he had seized, brought S. for the first time into collision with the British, who had espoused Ragoba's cause; but in the war (1779—1782) which followed, fortune distributed her favours with impartiality, and by the treaty of Salbye (1782), S. was recognised as a sovereign prince, and confirmed in all his possessions. In 1784, he captured the stronghold of Gwalior, and in the following year marched on Delhi, to restore his preponderance in the councils of the puppet monarch, and subsequently seized Agra, Allyghur, and nearly the whole of the Doab (q. v.). The manifold advantages of European discipline had struck him forcibly during the war with the British, and, with the aid of an able French officer, he introduced it into his own army. An army of 18,000 regular and 6000 irregular infantry, 2000 irregular and 600 Persian horse, with 200 cannon, was accordingly raised, and under the leadership of De Boigne, the officer above noticed, reduced Joudpore, Odeypore, and Jypore, three Rajpût states, and effectually humbled the pride of Holkar.—DOWLUT RAO SINDIA (1794—1827) continued his grand-uncle's policy, and during the troubles which convulsed Holkar's dominions at the commencement of the 19th c., he ravaged Indore and Poona, but was wholly routed in 1802 by Jeswunt Rao Holkar. Having joined Bhonsla, the rajah of Berar, in a raid on the Nizam (1803), he brought down upon himself the vengeance of the East India Company. The confederated Mahrattas were routed at Assaye and Argaum by Sir Arthur Wellesley; S.'s disciplined troops, under the command of French officers, were scattered irretrievably at Patpergunge (near Delhi) and Laswari by Lord Lake, and he only escaped total ruin by acceding to a treaty by which all his possessions in the Doab and along the right bank of the Jumna were ceded to the British. Gwalior was, however, restored in 1805, and from this time became the capital of S.'s dominions. S. had been taught by his reverses a useful lesson, and he declined to join Holkar, the Peishwa, and Bhonsla, in their attack (1817) on the British, and thus escaped the swift destruction which was visited upon his turbulent neighbours. During the reign of BHAGERUT RAO SINDIA, a minor, the Gwalior dominions were in such a state of anarchy, that the British were compelled to insist on certain guarantees for the preservation of tranquillity; and on these being rejected, a war followed, and the Mahrattas were routed at Maharajpûr (December 29, 1843) by Lord Gough, and at Puniaur by Major-general Grey on the same day. Gwalior fell into the hands of the British, 4th January 1844, and S. submitted to the conditions demanded of him, besides maintaining a contingent force of sepoys at Gwalior. In 1853, he was declared of age by the East India Company, and in 1858 he took the field at the head of his own army against the Gwalior contingent, which had joined in the great sepoy mutiny. But the most of his troops deserted him during the battle (June 1), and he narrowly escaped by fleeing to Agra. S. was subsequently reinstated by Sir Hugh Rose, and received from the British government numerous testimonials of its grateful respect for his faithfulness as an ally.

SI'NECURE (Lat. *sine cura*, without care), in common language, an office which has revenue without employment. In the canon law, a sinecure is an ecclesiastical benefice, such as a chaplainry, canonry, or chantry, to which no spiritual function is attached, except reading prayers and singing, and where residence is not required. The strictest kind of sinecure is where the benefice is a donative, and is conferred by the patron expressly without cure of souls, the cure either not existing, or being committed to a vicar. Sinecure rectories were abolished by 3 and 4 Vict. c. 113, s. 48.

SI'NEW. See TENDON.

SINGAPO'RE, one of the Straits Settlements (q. v.), belonging to Great Britain, consists of an island lying off the south extremity of the peninsula of Malacca, in lat. about 1° 17′ N., long. 103° 50′ E., and having a city of the same name on its south side. The island is 25 miles long, and from 14 to 15 broad; area, 206 sq. miles. It is separated from the mainland by a narrow but deep strait, varying from a mile to a few furlongs in width. The surface is generally low and undulating, the greatest elevation (Bukit Tima, or the Hill of Tin) being only 520 feet. According to Malay accounts, a colony was planted on the site of the present town by tribes who are inferred to have been Javanese, from the circumstance that the name Singapura, which they gave to their settlement, is most probably of Sanscrit origin (lion-town); the Javanese being the only people in these seas who have become fairly Hinduised. Be that as it may, in 1818 it was found by Sir Stamford Raffles to be an island covered with primeval forests, sheltering in its creeks and rivers only a few miserable fishermen and pirates. It seems to have been unclaimed by any power until 1811, when the Sultan of Jahore formally annexed it to his territories. The commanding position of S., in the very centre of the highway leading from British India to China, led

Sir Stamford Raffles to mark it out as the site of the first free port in the Malayan seas; and in 1819, the British flag was hoisted on the new settlement; although it was not till 1824 that Mr Crawford concluded a satisfactory treaty with the Sultan of Jahore, whereby the island of S., and all the islands within 10 miles of its shore, were given up in full sovereignty to the East India Company, on condition of a considerable yearly payment. Since then, the prosperity of S. has been almost without a parallel. Its position as an entrepôt for the trade of the Malayan Archipelago, the Eastern Peninsula, and China, and the wise policy that placed the commerce of the new port on an entirely unfettered footing, rapidly established a flourishing trade. In 1823, the imports amounted to £1,200,000; the exports to £920,000. In the year ending 30th April 1865, the value of the imports was £6,610,000; the exports, £6,630,000, being fully double the amounts in 1854—1855; and notwithstanding the recent opening up to more direct communication with Europe of many of the markets in China, Cochin-China, and Siam, hitherto largely supplied by traders from S., a steady increase in the trade of the port is still confidently looked for. The following list shews the chief countries with which this large trade was carried on in 1864—1865:

VALUE OF EXPORTS.

	Rupees.
Great Britain,	9,886,969
North America,	1,809,478
Calcutta,	10,597,455
China,	11,558,408
Cochin-China and Siam,	9,143,833
Java, Rhio, Bally, &c.,	3,954,654
Malay Peninsula and British Burmah,	3,763,865
Miscellaneous,	15,702,716
Total rupees,	66,417,378

VALUE OF IMPORTS.

	Rupees.
Great Britain,	18,353,150
Calcutta,	4,606,085
China,	8,346,969
Cochin-China and Siam,	3,523,024
Java, Rhio, Bally, &c.,	7,056,244
Sumatra,	1,467,741
Malay Peninsula and British Burmah,	5,897,278
Miscellaneous,	16,931,596
Total rupees,	66,182,087

The chief articles of export to Europe and North America are gambir, tin, sago, tapioca, black and white pepper, tortoise-shell, nutmegs, gutta-percha, camphor, coffee, sapan-wood, and rattans. Of these, only gambir, sago, and nutmegs are produced on the island to any important extent; all the other articles being imported, chiefly by natives from other quarters. From Europe, large imports are received of cotton manufactures, woollens and linen, metals, hardware, earthenware, arms and ammunition, and treasure in the form of dollars. Large fleets of prahus are wafted by the southerly monsoon towards this great centre of trade, laden with the numerous products of the Indian Archipelago, to return again laden with the manufactures of Europe. Exclusive of the vast number of native craft, the square-rigged vessels that entered the port in 1864—1865 numbered 1697, with a tonnage of 780,794; the number that cleared was 1529 vessels, of 578,527 tons.

The currency of commerce is the Spanish dollar; but the official currency of government is the rupee. The Chinese pecul, of 133⅓ lbs. avoirdupois, which is divided into 100 catties, is the standard of weight. The population of S. is perhaps the most heterogeneous in the world, comprising at least 16 nationalities, speaking different tongues. The Malay, however, soft and easily acquired, is the recognised medium of communication between all classes. The population of S. has been lately estimated as under:

Europeans and their descendants,	1,000
Chinese,	60,000
Malays,	13,000
Various natives of Continental India,	12,800
Other Asiatics,	7,000
Total,	93,800

Of the aboriginal inhabitants of the island, not a trace remains, but similar tribes are still to be found in small numbers in several parts of the peninsula. Of the native population, the Chinese are the most useful part; they form almost the only body of trustworthy native merchants, in the proper sense of the word, and are freely trusted to large amounts by European importers; and it may be doubted whether, as a commercial body, they are, on the whole, more deficient in morality than many European communities. The government of S. is presided over by the governor of the Straits Settlements (q. v.). The laws are those of Great Britain, with some modifications; the court is that of a recorder. S. being a free port, the revenue is raised by inland excises on opium and spirits. Negotiations have for some time been going on for the transference of the entire government of the Straits Settlements to the Colonial Office.

The town of S., which contains nine-tenths of the whole population of the settlement, is situated at the mouth of a small river, on the south side of the island. Its appearance is of a mixed oriental and European character; the streets are generally wide, and kept in good order, and in 1864 the town was lighted with gas. There is an efficient police, and the sanitary arrangements of the town are good. The municipal council consists of public officers and ratepayers; the municipal revenue is raised by a rate on houses and land, and on horses and carriages.

S. possesses two fine harbours; one opposite the town, which, although little more than an open roadstead, is a safe and convenient anchorage, where ships load and discharge by means of lighters; the other is about 3 miles west of the town, and is land-locked, and capable of admitting the largest vessels. Along its shores, extensive wharfs have been erected by steam-companies and individual merchants; and it is probable that when communication by railway with the town is established, the old harbour will be little used. There are several fortifications commanding the harbour and roads, but the increasing commercial and political importance of the place calls for a still stronger naval and military station. S. being within 80 miles of the equator, has little or no variety of seasons; the climate, although hot, is healthy; the temperature ranges from 71° to 92°; rain falls more or less on 200 days of the year, and the extent of the fall is about 87 inches. The soil of S. is not fertile, although the climate is such as to cover it with a rich and beautiful vegetation. The nutmeg was at one time successfully cultivated, but most of the trees having unaccountably died, this has been abandoned, and husbandry is now confined to the cultivation of the cocoa-nut, the pepper-vine and gambir plant, and to the raising of sugar-cane and vegetables for local consumption. The curse of S. is the tiger. It is estimated that 300 Chinamen and other natives are carried off yearly. Turtle are abundant on the shores, and form the cheapest animal food in the bazaars.—See Thomson's *Journal of the Indian Archipelago*; J. Crawford's *Dictionary of the Indian Islands and Adjacent Countries*; J. Cameron's *Our Tropical Possessions in Malayan India*.

SINGHARA NUT. See TRAPA.

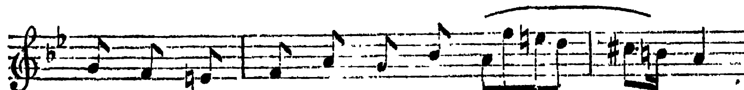
SINGING, the art of producing music from the human voice, generally, though not necessarily, combined with speech. The mechanism of the vocal organs, as applicable to singing, has by some physiologists been likened to a reed, by others to a stringed instrument; in point of fact, the human voice is produced by an apparatus far beyond either in complexity of structure.

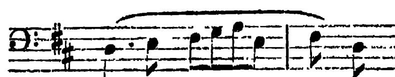
The extreme limits of the voice in respect of pitch may be considered to be from to ; but the compass of any individual voice is limited to a portion of that range, and voices are classified according to their pitch. Generally speaking, male voices lie an octave below female. The former are divided into *bass* and *tenor*, the compass of ordinary bass voices being considered to be from to , and of tenor from to . For tenor music, the tenor or C clef is generally used, , which has the advantage of having the principal tones within the staff. When the treble clef is used, the music is written an octave above its true pitch. Female voices are either *contralto* (otherwise called *alto*) or *soprano*, the former extending from to , the latter from to , or sometimes higher. Contralto music may be noted either on the treble clef or on the alto clef, which latter is but the tenor clef placed on the third instead of the fourth line of the staff . These are the principal divisions of voices; but there are also further subdivisions. Intermediate between bass and tenor is another male voice, called *baryton;* and intermediate between contralto and soprano, another female voice, called *mezzo soprano.* The ordinary compass of a voice is about twelve notes, but two octaves are not uncommon, and some voices have reached three. Madame Catalani is said to have possessed a voice of three and a half octaves compass.

The notes produced in singing are of two kinds, according as they proceed from the chest voice (*voce di petto*), or head voice (*voce di testa*). The chest notes, or lower register, proceed naturally and readily from the ordinary mechanism of the voice; the upper register, head voice, or falsetto, is produced by a more or less forced contraction of the cavity from which the voice proceeds, imparting to the notes a fife-like character, gentle and weak in the male voice, but often clear and sonorous in the female. It is only in the higher notes of the voice that the falsetto is used, and some notes on the borders of the two registers may be given in either. Where the two registers meet, the tones are apt to be hard and uncertain, or weak; but a cultivated singer will blend the head and chest voice at the point of junction, so as to make the break imperceptible. The notes of the bass voice are given entirely from the chest. In the tenor, the three or four upper notes belong mostly to head voice. The contralto tones are mostly chest voice, and the upper tones of the soprano are head voice. The alto, when sung, as it often is in England, by male voices, is principally falsetto.

In singing, the head should be held erect, and the chest well expanded, to allow free play to the lungs, and free emission of the voice from the throat. The tongue should be kept still, slightly pressing on the lower teeth. Proper regulation of the breath, and proper articulation of the words, are also matters of essential moment.

One particular requires to be mentioned, in which the notation of songs differs from that of instrumental music. In the latter, two or more quavers or semiquavers may be grouped together by a common line; in singing, this can only be done when the whole group are to be sung to one syllable, and notes belonging to different syllables are always written separately. When notes without hooks, or notes that are not grouped, belong to one syllable, they are bound together by a *slur* placed over them, e. g.:





Among the principal objects to be studied in cultivating the voice for singing are the improvement of its quality in respect of clearness and resources; the rendering every note in its compass equally pure; the extension of its compass, not by injudicious forcing, but by gradual practice; and the acquirement of the power to prolong any note with perfect ease. See MUSIC, VOICE, SOLFEGGIO.

SI'NGULAR SUCCE'SSOR, in the Law of Scotland, means one who succeeds in the ownership of property by purchase or any other mode than by descent.

SINIGA'GLIA, or **SINIGALLIA** (anc. *Sena-Gallia*), a city and seaport on the east coast of Italy, in the province of Ancona, and 17 miles west-north-west of the city of that name, at the mouth of the Misa, with 23,498 inhabitants. It is a bright, cheerful city, built after the modern style, walled round, and it has bastions and handsome gates. S. is celebrated for its annual fair, which lasts from the 20th July to the 10th August, and which

sometimes puts in circulation about 60 million francs in 20 days. English, French, Swiss, Americans, Germans, &c., attend it. S. was founded by the Senonian Gauls, and colonised by the Romans 289 B. C.

SI'NISTER, in Heraldry, the left-hand side of a shield. As shields are supposed to be carried in front of the person, the sinister side is that which covers the bearer's left side, and therefore lies to the spectator's right. See POINTS OF ESCUTCHEON.

SINKING FUND. See FUND.

SINO'PÉ (Turk. *Sinub*), a town of Asiatic Turkey, province of Anatolia, on the southern side of a little promontory running eastward into the Black Sea, 80 miles north-west of Samsun. S., which is defended by some half-ruined fortifications, possesses a dockyard and naval arsenal; exports timber, salt, cordage, fish, and oil, and has a population variously estimated at from 4000 to 12,000. The bay of S., which affords the finest anchorage for ships along the whole northern coast of Asiatic Turkey, was the scene of a bloody naval engagement, or rather massacre, 30th November 1853, when a Turkish squadron of 13 ships was suddenly attacked and destroyed by the Russian fleet.—Of the ancient city of S., which was founded by a colony of Milesian Greeks, and, for 200 years after the Peloponnesian war, was almost the mistress of the Euxine, numerous ruins still exist, 'friezes, hundreds of Corinthian columns, capitals, sculptures, inscriptions, and even statues, built up into the walls of its picturesque Byzantine fortifications.' S. was the birthplace of Diogenes the cynic.

SI'NOPLE, in Heraldry, the same as VERT (q. v.).

SI'NTER, the name given by German mineralogists to those rocks which are precipitated in a crystalline form from mineral waters. They are of recent date, belonging in fact to the strata at present in course of formation. S. is of various forms, kidney-shaped, knotted, tuberous, botryoidal, tubular, stalactitic, shrub-like, or pronged, and is occasionally distinguished by its chief component, as Calcareous S., Flint or Quartz S., Iron S., &c. Calcareous S., which is a variety of carbonate of lime, composed of concentric plane parallel layers, appears under various forms; it is deposited with extraordinary rapidity by many springs, a peculiarity frequently made use of to obtain the incrustation of objects with a coating of this substance. Quartz S. is mostly found in intermittent hot springs, as in the Geysers (q. v.) of Iceland. Iron S. occurs in old mines, and in coal-beds, where it is formed from iron pyrites through the agency of the atmosphere. The tubular conglomeration of grains of sand half-melted by lightning (*blitz*) is also known as Blitz-S., or Fulgurite (q. v.).

SI'NUS (Lat. a bend or hollow) has two significations in Anatomy, and one in Surgery. The cells or cavities contained in certain bones—as the frontal, ethmoid, sphenoid, and superior maxillary—receive this designation. The frontal sinuses are two irregular cavities extending upwards and outwards, from their openings on each side of the nasal spine, between the inner and outer layers of the skull, and separated from one another by a thin bony septum. They give rise to the prominences above the root of the nose called the nasal eminences. They are not developed till after puberty, and vary considerably in size, being usually larger in men than in women and young persons, in consequence of the greater prominence of the superciliary ridges in the former. When very much developed, they give a receding appearance to the forehead. They are larger in Europeans than in negroes, and are very imperfectly developed in the Australians, whose peculiar want of vocal resonance is apparently due to this deficiency. They communicate on each side with the upper part of the nostril by a funnel-shaped opening, which transmits a prolongation of mucous membrane to line their interior. These cells are much more highly developed in certain mammals and birds than in man. Professor Owen observes that 'they extend backwards over the top of the skull in the ruminant and some other quadrupeds, and penetrate the cores of the horns in oxen, sheep, and a few antelopes. The most remarkable development of air-cells in the mammalian class is presented by the elephant; the intellectual physiognomy of this huge quadruped being caused, as in the owl, not by the actual capacity of the brain-case, but by the enormous extent of the pneumatic cellular structure between the outer and inner plates of the skull.' The sphenoidal sinuses are two large irregular cavities, formed, after the period of childhood, in the body of the sphenoid bone. They communicate with the upper part of the nose, from which they receive a layer of mucous membrane. Like the frontal sinuses, they serve to lessen the weight of the skull, and to add to the resonance of the voice. The ethmoid sinuses or cells lie in the lateral masses of the ethmoid bone. They open into the cavities of the nose. Their main use is to diminish the weight of the fore-part of the skull. The superior maxillary sinus commonly known as the *Antrum of Highmore* (the anatomist who first accurately described it) is the largest of the facial sinuses. Its uses are the same as those of the others, and like them, it communicates with the nasal cavities.

The *sinuses of the dura mater* are quite distinct from the above-described bony sinuses; they are irregular channels for the transmission of venous blood, and are formed in the following way. The dura mater consists of two layers—an outer, belonging to the skull; and an inner, belonging to the brain. They can be easily separated in infancy, but in the adult they are blended together for the greater part of their extent. In some places, however, as beneath the sagittal suture (formed by the two parietal bones at the top of the head, and running from before backwards), they are separated on either side of the mesial line, the outer layer being continued beneath the bone, and in contact with it; while the inner one dips inwards, and meeting with the corresponding layer of the opposite side, forms a triangular canal or sinus, which is strengthened at the sides and angles by interlacing bands of fibrous tissue. The sinus whose formation we have thus described is called the superior longitudinal sinus, and the other sinuses are formed in the same way. They are all lodged in the intervals between the great divisions of the brain, and they are so constructed 'that their shape cannot easily be altered by any external pressure; consequently, the flow of blood through them cannot be impeded by the pulsations or pressure of the brain, in the varying positions of the body. The tense, unyielding character of their walls, moreover, does not admit of either collapse or distention; hence, they must be equally full at all times, and must exert a uniform pressure on the brain.'—Humphry *On the Human Skeleton*, p. 200.

In Surgery, the term *sinus* is nearly equivalent to *Fistula* (q. v.).

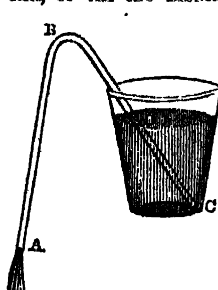
SION, a small town of Switzerland, capital of the canton of Valais, in a picturesque situation on the right bank of the Rhone, 18 miles north-east of Martigny by the Simplon Railway, of which it is the termination. It is defended by walls, towers, and a ditch, and contains a large cathedral and a handsome Gothic town-house. On the north of the

town is a lofty rock, divided into two peaks by a deeply-cut ravine. On the highest peak is the ruined castle of Tourbillon, built in 1294; on the other, the castle of Valeria, now used as a seminary. An excellent wine, called Malvoise, is made here. S. is called *Civitas Sedunorum* in a still existing inscription in honour of Augustus, to be seen in the cathedral; in the middle ages it was named *Sedunum*. Pop. about 3000.

SIOU'T, also *Es-Siout*, and *Osiût*, the chief city of Upper Egypt, stands near the western bank of the Nile, and is 200 miles in direct line south of Cairo. It has several fine mosques, bazaars almost as well furnished as those of the capital, some good baths, and one or two well-built houses. S. manufactures great quantities of the best pipe-bowls. It is the residence of the governor of Upper Egypt; the resort of the caravans from Darfur, that come by the way of the Great Oasis, and until recently was the principal seat of the Egyptian slave-trade. Pop. about 25,000. S. is built on the site of the ancient Lycopolis, but few remains of the Græco-Egyptian city are extant. From the neighbouring heights of the Libyan mountains, which contain numerous rock-sepulchres, the view over the valley of the Nile is, in the opinion of Lepsius, the finest in Egypt.

SIOU'X, a tribe of North American Indians, calling themselves also Dacotahs, inhabiting Dacotah territory. They are a brave and warlike people, generally at war with the Chippeways. Formerly they numbered 30,000, and counted 7000 warriors; at present their whole number is estimated at 8000. Roman Catholic missions were established among them 200 years ago, and they are more advanced towards civilisation than any tribe of the North-west.

SI'PHON is a tube bent so that the two legs are either parallel, or incline at an acute angle, and is employed to draw off liquids from vessels which it is not convenient or desirable to move. If the end of the short leg of a siphon be plunged into the liquid, and the other leg be suffered to hang outside the vessel, then, whenever the siphon is exhausted of air (a process which can be performed by suction by the mouth or a pump or by filling the tube with the liquid it is employed to decant, and keeping it so filled till it is placed in its proper position), the liquid will at once flow out of the vessel through the tube, and continue to do so either till it falls below the level of the outside end, or till the inside end ceases to be immersed.



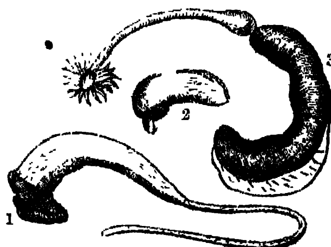
Siphon.

The principle of this simple and efficient instrument is easy of explanation: let ABC (fig.) be a siphon with one leg, BC, partially immersed in liquid, and suppose the whole siphon filled with the same liquid; then at A we have the pressure of the atmosphere acting upwards into the tube in opposition to the liquid in the leg BA; at C we have the pressure of the atmosphere (transmitted through the liquid), and the pressure of the liquid in the vessel outside (which balances an equal height of liquid inside) the tube, acting upwards into the tube in opposition to the pressure downwards of the liquid in the leg BC. The effective pressures inwards at A and C are, respectively, the atmospheric pressure less by the pressure of the liquid in BA, and the atmospheric pressure less by the pressure of the liquid in BD; and as the latter of these two is the greater, it overcomes the other, forces the liquid in the tube out at A, and that in the vessel into the tube at C, the process continuing till the liquid falls to the level of C (when air is admitted), or of A (when the two pressures become equal). It is evident from the above explanation that when A is on or above the level of D, the surface of the fluid, there can be no flow through the tube; also, that it is quite immaterial whether the longer or the shorter leg be immersed, if only A be below the level of D. If the bend of the siphon be 33 feet for water, or 30 inches for mercury, above D, the pressure at C, which produces the action of the siphon, becomes the weight of the atmosphere, diminished by an equal weight of a column of fluid, in which case the resulting pressure is zero, and there is no flow through the tube. The flow increases in rapidity and force as the difference of level between D and A increases, and as the difference of level between D and B diminishes. Many siphons have a suction-pump permanently attached to the end of the outer leg for the purpose of exhausting the air inside. Another variety is the *Wurtemberg siphon*, which has two equal legs, the extremities of which are bent upwards, so that when the siphon is once filled with fluid, it remains full, and is always ready for use.

SIPHONO'STOMA. See FISH-LOUSE.

SIPHONOSTO'MATA, a large group of gasteropodous molluscs, of the order *Pectinibranchiata*, having the mantle prolonged into a siphon, by which the water enters the gill-chamber. The shell is spiral, the aperture notched or produced into a canal in front, often much produced. To this group belong the families *Cypræidæ* (cowries, &c.), *Volutidæ*, *Buccinidæ* (whelks, &c.), *Muricidæ*, and *Strombidæ*. They are almost all carnivorous, and move about with considerable activity.

SIPU'NCULUS, a genus of *Echinodermata*, giving its name to a family, *Sipunculaceæ*, and to an order, *Sipunculidæ*. The *Sipunculidæ*, although ranked among the *Radiata*, and having the essential characters of that division of the animal kingdom,



Sipunculus Bernhardus:
1, Sipunculus alive in a periwinkle shell, with the upper part of the shell broken away to shew the animal's body; 2, S. freed from its shell, with the trunk retracted; 3, S. with all its parts expanded, as when preserved in spirits.—From Forbes's *British Star-fishes.*

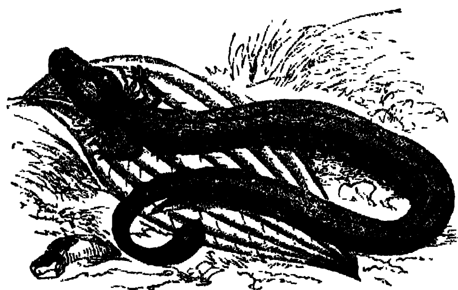
resemble the *Annelida* in form, general appearance, motions, and habits, as well as in their softer covering, which is leathery and not calcareous, and in the absence of calcareous spines. The *Sipunculaceæ* have a retractile proboscis, around the extremity of which is a circle of tentacula, and at the base of it the anus. In the genus *Sipunculus* the proboscis is long and cylindrical, with a circle of tentacula near its extremity. *S. Bernhardus* is common on many parts of the British coast, living at the bottom of the sea, at a depth of from ten to thirty fathoms, and occupying as a habitation the shell of

some univalve mollusc, for the protection of its soft wormlike body. It secures the entrance of the shell by a plaster-work of sand, leaving only a hole wide enough for the protrusion of its long flexible proboscis. Other species, instead of sheltering themselves in shells, burrow in the sand. Among these is the EDIBLE S. (*S. edulis*), much esteemed by the Chinese.

SIR (Fr. *sieur* and *sire*, contracted from *seigneur*; from Lat. *senior*, elder), a term originally corresponding to *dominus* in Latin, and which has come, when appended to the Christian name and surname, to be the distinctive mark of knighthood. It was at one time the practice to use the same title in addressing the clergy, a familiar instance being Sir Hugh Evans in the *Merry Wives of Windsor*. To so great an extent did this usage obtain, that a 'Sir John' came to be a common sobriquet for a priest. 'Sir' was here a translation of *dominus*, the term used for a bachelor of arts, originally in contradistinction from the *magister*, or master of arts, but eventually extended to the clergy without distinction. Used along with the Christian name and surname, 'sir' is now applied exclusively to knights and baronets. Standing alone, it is a common complimentary mode of address used without much consideration of rank or social status. 'Sire' is another form of the same monosyllable, which has been adopted from France as a mode of addressing royalty.

SIR-DA'RIA. See JAXARTES.

SI'REN, a genus of perennibranchiate batrachia, of eel-like form, but having two small weak limbs on the fore part of the body. Each foot has four toes. There is no vestige of a hinder pair of feet, nor of a pelvis. The vertebræ are numerous, and each of the vertebræ of the body carries a pair of short



Siren Lacertinus.

ribs. The vertebræ of the tail are compressed, and gradually diminish in size to its tip. The head is flattened, the mouth not deeply cleft, the muzzle blunt, the eyes very small, the ears concealed. The teeth are small; the lower jaw is furnished with them all round; there are none on the upper jaw, but two rows on each side of the palate. On each side of the neck are three gills, each consisting of a short fleshy stalk, supporting a beautiful fringe-like tuft, and water passes from the mouth to the gills through openings as in fishes. But the S. has also lungs, which are long bags, one on each side, beginning behind the heart, and extending almost the whole length of the abdomen. The blood discs are remarkable for their large size, exceeding even those of the proteus. The sirens inhabit the swamps of the Carolinas and other southern parts of North America. They live chiefly in the mud, but sometimes are to be seen swimming in the water, and even make excursions on moist ground. They feed on worms and insects. *S. lacertina* grows to the length of about three feet. Its colour is blackish. The tail is compressed. The other species are smaller.

SIRÈNE, an instrument for the production of musical sounds in such a manner as to enable us to discover their ultimate nature. The simplest form of sirène is represented in section in fig. 1. A vane consisting of four equal plates, attached to a delicately supported axle, is so fixed in a metal tube as to close it almost completely (with the help of stops P, P), when either pair of plates is perpendicular to the axis of the tube. When air is forced from a bellows through the pipe A, it gives the vane a rotation in the direction indicated by the arrow, and

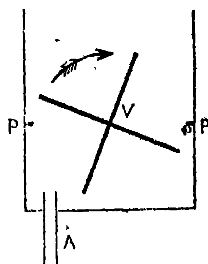


Fig. 1.

thus produces a current which is interrupted four times in each revolution. In other words, four times in each revolution the air escapes freely, giving rise to a sound. While the vane revolves slowly, the ear distinguishes these successive puffs; but when the revolutions are more numerous than about five per second, the successive puffs cannot be distinguished, and the recurrent sounds are merged into a uniform note, whose pitch rises (i. e., it becomes more and more shrill) the faster the vane revolves. Such an instrument works well when driven by water instead of air. What it shews is, that musical sounds consist of the repetition, at equal very small intervals of time, of some definite noise. By turning the vane by means of a train of wheels, so as to give it a definite rate of rotation, the number of such repetitions per second, necessary for the production of a given musical note, may be measured.

But the sirène of Cagniard de la Tour is much more valuable for such a purpose, as it counts for itself the number of repetitions per second. In principle, it is identical with the simpler instrument just described; but the details of its construction are different. It consists essentially of two circular discs, the upper of which is free to revolve so as almost to touch the lower (fig. 2). In each a series of holes is cut, arranged at equal distances in a circle about its axis. Through the holes in the lower (fixed) plate, streams of air are admitted from a bellows,

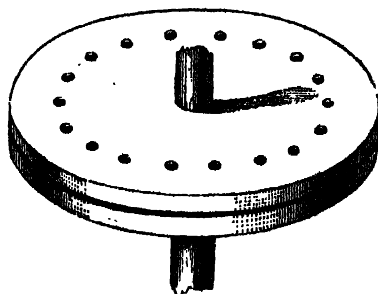


Fig. 2.

and pass through the corresponding holes in the upper (movable) plate, when the pairs of holes are superposed; but are checked when the upper plate is turned a little, readmitted when the plate turns a little further, and so on. The holes are pierced *obliquely* through the upper plate, so that the issuing

stream makes it turn about its axis. The sounds given by this instrument are exceedingly pure (see SOUND), like those of the flute or tuning-fork. The axis of the upper plate carries an endless screw, which turns a light train of wheels (with dials) resembling that of a gas meter, so that when, by proper adjustment of the pressure in the bellows, the instrument gives steadily some definite note, we may observe the number of turns in any number of minutes by a watch. The number of puffs is obviously to be found from this by multiplying by the number of holes in the plate, since during one turn any hole in the upper plate has been opposite each of those in the lower plate in succession. Thus we find the number of puffs per second necessary to the formation of any given musical note.

More complex forms, such as Helmholtz's double sirène, have been devised for more recondite branches of the science. See SOUND.

SI'RENS (Gr. *seirênes*, the 'entanglers,' probably from *seira*, 'a cord' or 'string') figure in Greek mythology as young maidens, who sat on the shores of a certain island or promontory near the south-western coast of Italy, and sang with bewitching sweetness songs that allured the passing sailor to draw near, but only to meet with death. Homer speaks of them in the plural, but does not specify their number; later writers mention two and three by name, and assign them various genealogies. Their tenure of life was dependent on the successful exercise of their charms. If any seaman could resist the enticements of their magic music, they were doomed, but Ulysses or the Argonauts alone succeeded in doing so. It is related by Homer, in the *Odyssey*, that when the former in the course of his wanderings approached their perilous home, he, by the advice of the sorceress Circe, stuffed the ears of his companions with wax, and lashed himself to a mast, until he had sailed out of hearing of the fatal songs. Others say that it was the Argonauts who got safely past, owing to the superior enchantment of Orpheus's singing, whereupon the S. threw themselves into the sea, and were transformed into rocks. The Latin poets give them wings, and in works of art they are often represented as birds with the faces of virgins, and are provided with musical instruments. There is obviously a close resemblance between the Mermaid (q. v.) of northern mythology, and these Græco-Mediterranean Sirens. The Loreley of the Rhine is only a river-siren, though a more exquisite enchantress than ever Greek fancy conceived.

SIRINAGUR. See SERINAGUR.

SI'RIUS, otherwise called *Canicula*, or the *Dog-star*, is a star of the first magnitude, the brightest in the heavens, and is situated in the constellation of *Canis Major*, or the 'Great Dog.' It is about 123 billions of miles distant from the earth. See STARS. It has long been known to possess a 'proper motion' (i. e., an independent progressive motion), which was for a time believed to be in a straight line, but has now been shewn to consist of an undulatory progressive motion on each side of a middle line. This motion was investigated by Professor Peters of the Pulkowa Observatory, Russia, on the supposition that its anomalous character was produced by the attraction of some unseen neighbour, and his calculations being completed and verified (on this supposition) by Mr Safford of Washington, the distance of S. from the centre of gravity of both was determined to be 1495 millions of miles. In January 1862, Mr Alvan Clark of New York, chancing to observe S. through a powerful telescope, detected a minute star (which had never before been observed) situated at an angular distance of 7″ from S., representing about 4300 millions of miles, and it is generally believed that this is the disturber in question. By photometric measurement it has been shewn that, supposing the intensity of the sun's light for unit of surface to equal that of S., it would require 400 suns at the distance of S. to send us the light which that star does; and our sun at the distance of S. would appear less than a star of the sixth magnitude, and be invisible to the naked eye. The Egyptians called this star Sothis, and at one time its 'heliacal rising' (q. v.) was a sure forerunner of the rising of the Nile; while among the Romans it was considered as a star of evil omen, whose appearance above the horizon coincided with (or even caused) the unhealthy and oppressive heats of summer. Hence the origin of the various superstitions regarding the Dog Days (q. v.), many of which are still current.—The term 'dog star' was also applied to Procyon, a bright star in *Canis Minor*, whose heliacal rising differs only by a few days from that of Sirius.

SIRO'CCO. See SIMOOM.

SISMONDI, JEAN CHARLES LEONARD DE, a distinguished historian of Italian descent, was born at Geneva on 9th May 1773. He received his education as a boy at the 'College' or high school of his native town. At the due age, he was removed to the Auditoire, or university. Before he had completed his education, the pecuniary reverses of his father made it necessary for S. to do something for his own maintenance, for which purpose he entered the counting-house of the eminent firm of Eynard and Co. of Lyon. Hateful as mercantile pursuits seem to have been to him, he applied himself to his drudgery with all diligence. He became a thoroughly good clerk, and in after life he acknowledged that the practical training had been of incalculable benefit to him. The French revolution sent S. back to Geneva, but the storm following, he took refuge in England, along with his family. Home-sickness soon sent them back to Geneva, but the continuance of political trouble made it impossible to remain there long. In 1795, they bought a small farm near Pescia, in Tuscany, where their narrow circumstances rendered it necessary for S. almost literally to put his hand to the plough. He had now, however, leisure for literature. In 1798, he began to collect materials for his *History of the Italian Republics*. In 1803, appeared a work on political economy, *De la Richesse Commerciale*, in which he writes like a decided follower of Adam Smith, though at a later period, in his *Nouveaux Principes d'Économie Politique* (1819), he abandoned the wiser views of his youth. In consequence, a professorship in this science was in the same year offered to him in the university of Wilna, which he declined. It was in history, however, that his literary forte lay. The 16 vols. of his *Histoire des Républiques Italiennes*, published between 1807 and 1818, placed him in the first rank among contemporary historians, and brought him praise from the most distinguished men in France and Germany. The events of the Hundred Days occasioned one of the most memorable passages in the life of S.—his interview with Napoleon. In 1813 appeared his *Littérature du Midi de l'Europe* ('Literature of the South of Europe,' Eng. by Roscoe, frequently reprinted). In 1819, he began his best and greatest work, the *Histoire des Français*, with which he was occupied until his death. On the 19th April of the same year he married Miss Allen, an English lady, whom he had previously met in Italy. This marriage was followed by many happy

years, during which S. resided at Geneva, making frequent visits to Pescia and England. His latter days were, however, darkened by the troubles of his native city, in whose politics he took a keen interest. He died 25th June 1842. S. has contributed more to historical literature than any other writer of his time, and the labour which he bestowed on his works has never been surpassed. 'Nine times,' he says, 'have I traversed Italy, and I have visited every place which has been the scene of any great historical event.' For twenty years he worked habitually eight hours a day. Both as a worker and as a thinker, he was thoroughly conscientious. His mind was to the last open to truth; neither fettered by prejudice nor blinded by self-conceit. At the same time, no one has surpassed him in tenacity of purpose, nor in energy in following it out. His feelings on religious questions were especially intense. Having on one occasion heard a sermon in an English church on eternal punishment, he vowed never again to enter another church holding the same creed; and 'never to contribute to spread what the English call their Reformation; for, by its side Romanism is a religion of mercy and peace.' His private character was singularly amiable and benevolent. His whole career is a noble one, full of interest and instruction.—See *Quarterly Review*, September 1843; *Vie et Travaux de Sismondi* (Paris, 1845); see also his Correspondence with Mademoiselle de St Aulaire (Paris, 1863); and his *Lettres Inédites à Madame d'Albany* (1864).

SISTERS OF CHARITY. See BROTHERS AND SISTERS OF CHARITY.

SISTO'VA, an important commercial town of Turkey, in the eyalet of Widin, on the south bank of the Danube, about 35 miles up the river from Rustchuk. It has several mosques, an ancient and strong castle, where the 'peace of Sistova' between Austria and Turkey was concluded in 1791; manufactures cottons and leather, and carries on an active river-trade. Pop. about 20,000.

S'ISUPÂLA is in Hindu legend the sovereign of Chedi, a country situated in Central India, who was the enemy of Krishn'a (q. v.), and ultimately was slain by him. The history of this enmity, and the death of S., are the subject of the *S'is'upâlabadha* of Mâgha. See SANSCRIT LITERATURE.

SI'SYPHUS, a personage of Greek mythology, whom later accounts make to be the father of Odysseus. He is said to have been founder and king of Ephyra—afterwards Corinth—and both he and his whole house were notorious for their wickedness. He is, however, best known for the punishment which he suffered in the lower world, either for treachery towards the gods, or for his wholesale robbery of travellers, whom, at the same time, he murdered with a huge block of stone. He was condemned to roll an immense boulder from the bottom to the summit of a hill, which, whenever it reached the top, rolled down again, and the task of S. had to be begun anew.

SÎTÂ is, in Hindu Mythology, the daughter of Janaka, a king of Mithilâ, and the wife of Râma. See VISHN'U. The word means literally 'furrow,' as she was not born in the usual sense of this word, but arose from a furrow when her father was ploughing the ground, whence she is also called *Pârthivî* (from *pr'thivî*, the earth). Her history is related in the RÂMÂYAN'A (q. v.).

SI'TKA, or NEW ARCHANGEL, the principal settlement in Russian America, is a small place of about 1500 inhabitants, on the west coast of the island of Sitka or Baranov, the largest island in the group known as George III.'s Archipelago. Lat. 57° 3' N., long. 135° 18' W. S. is the residence of the governor of Russian America, and has a magnetic observatory. Here the chief establishments of the Russian-American Company, incorporated 1799, for fishing and hunting fur-bearing animals, were situated. The Company employed 50 ships, and about 850 men, but their privileges expired in 1863.

SITOPHO'BIA, or SITOMA'NIA. The repugnance to or refusal of food may range from mere impairment or loss of appetite, or hysterical antipathy to particular viands, to total and prolonged abstinence, as a symptom of delusion or delirium. In the insane, food has been consistently refused for years. During this time, the system was, of course (see FASTING), sustained by compulsory alimentation. The causes of such a course are generally local disease in the organs of digestion, creating disgust and loathing towards food, and associating suffering with the process of nourishment; the fear of death, or the desire for death. The motives assigned for such feelings or resolution vary, of course, as the morbid condition may affect the stomach or the brain; and, according to the mental state predominating, suicide may be courted, or poisoning, drugging, or pollution of aliment may be dreaded. The throat or bowels may be imagined to be hermetically sealed; God or Satan may have imposed abstinence; the body is dead, inanimate, or belongs to another. Absurd as such principles of action may be, they prove inexpugnable to persuasion, or to the pangs of hunger and exhaustion, and require a special course of treatment. The determination may be exorcised by medicine; it may be overcome by commands, threats, bribes; it may be evaded by giving eggs, cocoa-nuts, milk from the cow, and other substances, into which mercury, arsenic, &c., cannot well be introduced; or it may be defeated by placing food in the stomach through the instrumentality of the stomach-pump. There have been epidemics of maniacal abstinence.—Chipley, *American Journal of Insanity*, July 1859; Browne, *Report Crichton Institution*, 1854.

SI'TTA. See NUT-HATCH.

S'IVA (a Sanscrit word, literally meaning happy, auspicious) is the name of the third god of the Hindu Trimûrti (q. v.) or triad, in which he represents the principle of destruction. The name S., as that of a deity, is unknown in the Vedic hymns, but established as such in the epic poems, *Purân'as* and *Tantras*. The worshippers of S. (see S'AIVAS) assign to him the first place in the Trimûrti; and to them he is not only the chief deity, but the deity which comprises in itself all other deities. Thus, in the *S'iva-Purân'a* (see PURÂN'A), he is addressed as Brahma, Vishn'u, Indra, Varun'a, as the sun and the moon, as earth, fire, water, wind, &c.; but even in the Purân'as relating to Vishn'u, his power is exalted in praise, and he is addressed with the utmost awe. The symbol of S. is the *Linga* (q. v.), emblematic of creation, which follows destruction. From each of his numerous attributes or characteristics he derives a name or epithet. He has five heads (hence his name *Panchânana*, &c., the five-faced); three eyes (hence his name, *Trinetra*, &c., the three-eyed), one of which is on his forehead, and indicates his power of contemplation; and in the middle of his forehead he wears a crescent. His hair is clotted together, and brought over the head so as to project like a horn from the forehead. On his head he carries the Ganges, whose course he intercepted by his hair, when

this river descended from heaven, so as to enable the earth to bear its fall (hence his name, *Gangâdhara*, &c., the Ganges-bearer). Round his neck he carries a garland of human skulls; and his throat is dark blue, from the poison which he swallowed when it emerged from the ocean, churned by the gods for the attainment of the beverage of immortality, and threatened to destroy the world. In his hands he holds the trident, a club or pole, armed at the upper end with transverse pieces, representing the breastbone and ribs adjoining, and surmounted by a skull and one or two human heads. His weapons are the *Khinkhira*, which is not described, a bow called *Ajakava*, or *Ajagava*, a thunderbolt, and an axe. As the destroyer of the world, he is also called *Kâla* (Time or Death), and represented as of black colour. One of his representations is also half-male and half-female, emblematic of the indissoluble unity of the creative principle (hence his name, *Ardhanâris'a*, the half-female-lord). He is clothed in a deer-skin; or he also holds a deer in one of his hands; or he sits on a tiger-skin, or is clothed in it. When riding, his vehicle is the bull Nandi, whom he also carries as an emblem in his banner. He resides on the wonderful mount Kailâsa, the northern peak of the Himalaya, where he also rules over the north-east quarter. His principal wife is *Durgâ* or *Umâ* (q. v.); his sons are GANES'A and KÂRTTIKEYA (q. v.). One of his principal attendants is *Tan'du*, who is one of the original teachers of the arts of dancing and mimicry, whence S. is the patron of the dancers, and is called *Nat'es'wara* (lord of the dancers). Besides Tan'du, a host of other attendants and companions, together with demons and other beings surrounding him, are named by the Purân'as.

Amongst the principal achievements of this god is his conflict with the god Brahma, who was originally possessed of five heads, but lost one through exciting the anger of S.; for the fifth head of Brahma once disrespectfully addressing S., and even challenging his power, S. immediately cut off the offending member with the nail of his left thumb. A similar penalty he inflicted on *Daksha*, his father-in-law, who once performed a great sacrifice, but neither invited his daughter Satî nor her husband S'iva. S. nevertheless, appeared at the sacrifice; but when Satî, offended at the reception she met with, threw herself into the sacrificial flames, S. cut off the head of Daksha; and Daksha would have remained headless, had not the gods interfered in his favour with S., who, out of compassion, replaced his head by that of a ram. Besides these feats, he killed several demons—*Ruru*, *Andhaka*, *Tripura*; and he also reduced to ashes *Kâma* (the god of love), who, at the instigation of the gods, undertook to excite the desire of S. to procreate a son, but was indiscreet enough to choose for this purpose a time when S. was engaged in fierce austerities (see KÂMA). S. is especially worshipped under the symbol of the Linga; but there are periods at which homage is paid to him also, under other forms, corresponding with the description given above. Hindu mythology knows, properly speaking, no incarnations of S. like those of Vishn'u; in some writings, however, some of his forms, especially that called Bhairava, and that called Vîrabhadra, are considered to be his sons or incarnations. S., like Vishn'u (q. v.), has a thousand names by which he is addressed; some derived from his exterior attributes have been mentioned before; among the rest, the principal are *Is'a* or *Is'wara* (lord); *Mahes'a* or *Mahes'wara* (the great lord); *S'ankara* (the conferrer of happiness); *Rudra* (the terrible), or *Mahârudra* (the very terrible); and *Mahâdeva* (the great god). For his worshippers, see S'AIVAS.

SI'VAS, a city of Asiatic Turkey, capital of the pashalic of the same name, is situated on the Kizil Irmak (anc. *Halys*), 60 miles south-south-east of Tokat. S. covers a large extent of ground, is well built, has numerous old mosques, khans, gardens, and excellent bazaars, manufactures coarse woollens, and carries on a considerable transit trade. Pop. 25,000, of whom about 5000 are Armenians, the rest Turks. S. is built on the site of the ancient *Sebasteia*, from which it derives its name.

SIVA'SH, or PUTRID SEA. See CRIMEA.

SIVATHE'RIUM (*Siva*, an Indian god; and Gr. *therion*, a wild beast), a remarkable genus of extinct mammals, found in the Miocene strata of the Sewalik Hills, in Northern India. It had a large skull, nearly as long as that of an elephant, supported on a neck little short of that of a giraffe, but much stronger. The face was short, and the nasal bones were prolonged into a pointed arch above the external nostrils, indicating the existence of a trunk or proboscis, an organ unknown among the Ruminantia to which it belonged. Like the existing 4-horned antelope of India, it had two small diverging horns, rising from the brow between the orbits, and two large, probably palmated horns, further back. In general appearance, it resembled a huge antelope. The remains of two species have been described by Falconer and Cautley.

SIX ARTICLES, STATUTE OF, an enactment of the 33d year of Henry VIII., passed June 7, 1541, and commonly called the Bloody Statute. The object of this statute was to compel, from all the subjects of the crown, the uniform profession of certain doctrines, six in number, which are carefully recited in the act. These doctrines are (1), the Real Presence of Christ in the Eucharist, and Transubstantiation; (2), the sufficiency of communion in one kind only; (3), the unlawfulness of the marriage of priests; (4), the obligation of vows of chastity; (5), the propriety of retaining private masses; (6), the expediency and necessity of auricular confession. The penalties of this act exceeded in severity almost every precedent, at least in England, and they are specially severe against impugners of the first article, all of whom, whether they dispute, write, or preach against it, are to suffer death as heretics, with forfeiture of all their goods to the crown, and without being allowed to abjure the error. With regard to the remaining four articles, the usual penalty of felony is attached to the crime of publicly preaching against them; private impugners are liable for the first offence to imprisonment at the king's pleasure, for the second, to death; and the same, or nearly the same penalties are enacted against priests or nuns marrying or cohabiting, and against persons contemptuously refusing to confess at the prescribed times, or to receive the sacraments. The act at first was enforced with great severity, but it was somewhat mitigated in 1544, and was finally repealed in 1549.

SIXTUS, the name of five popes, of whom two call for particular notice, Sixtus IV. and Sixtus V. The former (originally named Francesco della Rovere), born July 22, 1414, was a native of a small village near Savona, and a member of a very humble family. He was a scholar of the celebrated Cardinal Bessarion, and became a member of the Franciscan order, in which capacity he obtained the highest reputation throughout Italy as a preacher. On the death of Paul II. in 1471, Rovere was elected to the Roman see. The domestic government of S. has been strongly condemned. His inordinate partiality to his relatives exhausted

the papal treasury, and led to many questionable exactions, and to gross abuses in the dispensation of church patronage. His excessive facility, too, in dispensing favours, led to his not unfrequently conferring the same benefice on more than one individual. But the worst imputation upon the memory of his pontificate arises in connection with the political affairs of Florence, and especially with the conspiracy against the Medici family, known in history as the Pazzi conspiracy. In the last act of this nefarious plot, the murder of Giuliano in the church at Florence, S.'s nephew, Riasio, was present, and when, after its failure, the leaders, including the Archbishop of Pisa, were executed, S. excommunicated the Duke Lorenzo and all the magistrates of the city. Although this censure was passed professedly for the violation of the immunities of the church in putting an ecclesiastic to death, yet it has drawn upon S. the suspicion of complicity, or at least of connivance after the fact; and has led to much controversy among historians. The necessities of defence against the Turkish invasion embarrassed still further the finances of the pope, and even the Catholic historians deplore the lengths to which ecclesiastical exactions and the simoniacal distribution of benefices were carried in the latter years of Sixtus. In many respects, nevertheless, his administration was liberal and public spirited. He did much to foster learning and to encourage art. Under him, the Vatican library continued to increase, and he contributed notably to the improvement and decoration of the city. In 1482 he entered into an alliance with the Venetians against the Duke of Ferrara, which led to a general Italian war, and ended in a dissolution of the Venetian alliance, so mortifying to the pope, that his death is said to have been caused by chagrin and mortification, August 13, 1484.—Sixtus V., in many respects, one of the most remarkable of the modern occupants of the Roman see, originally named Felice Peretti, was born (December 13, 1521) near Montalto, of parents so poor, that his boyhood was spent in the humble occupation of a swineherd. While thus engaged, the boy attracted the notice of a conventual Franciscan father, who procured his admission into the order. He was ordained priest in 1545, and became professor of theology at Siena. His reputation as a preacher led to his being transferred to Rome, where he rose to its first dignities. He accompanied Cardinal Buoncompagno as theologian in his legative mission to Spain (1565); and on the accession of Pius V. to the pontificate, was named cardinal (1570). On the accession of his former patron, Buoncompagno, under the name of Gregory XIII., Cardinal Montalto might have exercised the highest influence, but he lived a retired and mortified life, and was believed to have fallen almost into the decrepitude of age and infirmity. This appearance was afterwards ascribed by his enemies to the design of concealing his ambitious views; and there is a well-known but apocryphal story of his having, when elected pope on the death of Gregory in 1585 (April 24), flung aside his crutch, and revealed himself to the astonished cardinals in the full vigour of his physical strength and his moral character. His pontificate, however, was a most active and energetic one, and was marked by vigorous measures of improvement in every department of administration, ecclesiastical as well as civil. His first care was to repress the prevailing licence and disorder of the city of Rome, and of the papal states generally, by effectually breaking up and exterminating the lawless bands of outlaws by which both were infested. His administration, both in this matter and in the repression of immorality, was rigorous perhaps to the extreme of cruelty; but the evil was one which seemed to call for extreme remedies. He reformed the administration of the law, and the disposal of public patronage; and he entered upon numerous and most comprehensive projects for the moral and material improvement of Rome. Many of his great works are still recognisable at Rome under his name, and are popularly remembered as his; among which are the library buildings of the Vatican. A distinguishing characteristic of his administration, too, was its disinterestedness. He steadfastly refused to use his position for the purpose of advancing any of his relatives, or to bestow upon them property or money derived from the public; and by judicious retrenchment he secured within the first years of his short pontificate a surplus of above 5,000,000 of crowns. It is of course impossible to enter into the details of his foreign policy; it will be enough to say that its great aim was, in the strongest sense of the words, to advance the cause of the Roman Catholic Church in every portion of Christendom, against the Huguenots in France, against the Lutherans in Germany, and against Queen Elizabeth in England. At the same time, he entertained a deep jealousy and apprehension of the designs of Spain; and he resisted persistently the excessively rigorous measures of the Spanish Inquisition as organised under Philip II. His church administration was equally vigorous and energetic. He fixed the number of the Sacred College of Cardinals at 70; and it was under him that the present organisation of separate congregations of cardinals for the several departments received some of its most important developments. He published a new edition of the Septuagint, and an edition of the Vulgate, which has become famous from the multiplicity of its errors, subsequently corrected in the edition of Clement VIII. Many of the popular stories regarding him are derived from Gregorio Lete's *Vita di Sisto V.* (2 vols., Lausanne, 1669), a work of no authority. See also Tempesti, *Storia della Vita e Gesti de Sisto V.* (2 vols., Rome, 1754); Lorentz, *Sixtus V. und seine Zeit* (Mainz, 1852); Ranke, *Fürste und Völker von Süd-Europa*, and Segretain, *Sixte V. et Henri IV.* (1861).

SI'ZAR (from *size*, in university slang, an allowance of victuals from the buttery—or the smallest quantity of anything which can be bought, a word derived from *assize*, formerly the same as *assess*, to apportion), a name given to an order of students at Cambridge and Dublin universities, who are admitted on easier terms than others. Duties of a somewhat menial kind were originally required to be performed by the sizars, but these have long since gone into disuse. Sizars are not on the foundation, and therefore so long as they remain such, are not eligible for fellowships; but they may at any time become pensioners, and generally sit for scholarships immediately before taking their first degree. If successful, they are on the foundation, and may become candidates for fellowships when they have taken their degree.—At Oxford, there is a similar order of students, denominated Servitors.

SIZE. See Glue and Gelatine.

SKA'GEN, Cape, or The Skaw, the most northerly point of Jutland, Denmark. On it is built a light-house of stone, 67 feet high, the lat. of which is 57° 43′ 8″ N., long. 10° 36′ 5″ E.; and near it is a small town of 1400 inhabitants.

SKA'GER-RACK ('Crooked Strait of Skagen;' *rack* is probably from the same root as A.-S. *raca*, Ger. *rachen*, throat; thus being equivalent to the Celtic *Kyle* [in Kyles of Bute], Lat. *gula*, English *gully*—is the *Race* of Alderney allied to *Rack*?), an arm of the North Sea (q. v.) lying between Denmark and Norway, and communicating with the Cattegat, is about 150 miles long from

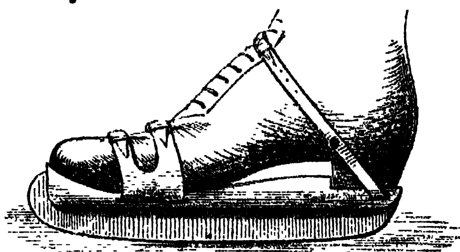
west-south-west to east-north-east, and 80 miles broad. The depth is much greater on the Norwegian than on the Danish coast, being on the former about 200 fathoms, while on the latter it varies from 30 to 40 fathoms, increasing towards the centre to about 60. When free from violent storms —to which, however, it is very subject—the current runs east on the side next Denmark, and west on that next Norway, the harbours being all on the latter coast.

SKALD (allied to *skill;* the radical sense is, to separate, and hence to discern) signifies, in old Norse, a poet. The name was given specially to that class of poets who exercised their art (*Skálld-skapr*) as a vocation requiring a learned education; that is, a knowledge of the construction of verse, and of the enigmatical imagery, roughly shaped out of obscure tradition, to which Scandinavian poets were prone. The great, if not the only aim of the Skaldic poetry was to celebrate the deeds of living warriors or of their ancestors. For this reason, princes attached Skalds to their courts, and competed with each other, by magnificent presents, for the possession of the most skilful minstrels. Very few complete Skaldic poems are extant; but, on the other hand, the multitude of fragments preserved, partly in the younger Edda (q. v.), partly in the Sagas (q. v.), and the Heimskringla (q. v.), is very great. A manuscript of the younger Edda, belonging to the university of Upsala (which has been printed in the *Historia Literaria Islandica* of Einarsen), contains a list of the most celebrated Icelandic and Norwegian Skalds of the 13th c., under the name of *Skálldatal*. The songs relating to the religious and heroic traditions of the North, which are found in the Edda, go back to an earlier time, in which the class or school of 'Skalds,' properly so called, did not yet exist. The authorship of these primitive Eddaic songs is unknown; but they are the sources from which the 'Skalds' of later times drew much of their inspiration.

SKA'LITZ, or SZAKO'LCZA, a town in the north-west of Hungary, near the borders of Moravia, 47 miles north of Presburg, on the left bank of the March, with a pop. of 8790. It is nearly in the form of a square, is surrounded by walls, has several Protestant and Roman Catholic churches, a Franciscan monastery, town-hall, &c., besides large manufactures of cloth. Good wine is produced in the vicinity, and hemp is largely grown.

SKATE, the popular name of several species of Ray (q. v.).—The COMMON S. (*Raia batis*), known in Scotland as the *Blue S.* or *Gray S.*, and in the south of England as the *Tinker*, is plentiful on most parts of the British coasts; the breadth of the body is to its length in the proportion of about four to three; the snout sharp; a slight concavity in the outline between the snout and the extreme lateral angle of the pectoral fin; a short hard tubercle in front of each eye, and another on the inner side of each; a single row of spines commencing on the dorsal ridge near the origin of the ventral fins, and reaching along the tail as far as the first of the two small fins which it bears; the upper parts grayish brown, the belly dusky white with darker lines. It attains a large size, having been known to weigh 200 lbs.—The LONG-NOSED S. (*R. rostrata* or *mucronata*) is remarkable for the elongation and sharpness of the snout. The upper surface is of a light lead colour, the lower grayish white. The tail has a row of crooked spines. This species is not uncommon on the British coasts, and attains a large size.—The SHARP-NOSED S. (*R. oxyrhynchus*) has also a very sharp snout, but less elongated. It is thicker in proportion to its other dimensions than any of the other British species, and attains a very great weight. The line of the body from the snout to the extreme lateral expansion is waved. The tail is armed with three rows of spines. The upper surface is of a brown colour; the colour being lighter than in the other species, this is generally known in Scotland as the *White Skate.*—The FLAPPER S. (*R. intermedia*) is very thin and broad; it has only a line of pointed tubercles on the tail; the upper surface is dark olive green, with numerous white spots. Skates are very voracious. They are often caught by lines, but the greater number of those brought to market are caught by trawl-nets. They are much esteemed for food in most countries, yet on some parts of the British coast they were until recently rejected as worthless.

SKATES AND SKATING. Skates are small keels or blades of iron or steel which are placed under the soles of the feet for the purpose of enabling the wearer to glide along the surface of ice. They are usually fitted to pieces of wood carved into somewhat of a boat-like form, to which straps of leather are adjusted, to enable the skater to attach them firmly to his feet. Of late, in some improved skates, the wood has given way to metallic fittings, which are neater, and perhaps preferable; they are, however, liable to rust, and consequently to get out of order. In Britain,



Skate attached to the Foot.

skating is a favourite pastime in winter; and in England, and Scotland especially, is carried to a degree of excellence not known in other countries: the skaters study the most graceful curves, and the nicest possible balancing of the body, when going at great speed. In such countries as Holland and the more northern parts of Europe, skating is used merely as a necessary means of locomotion among the labouring classes, and its more ornamental manœuvres are rarely practised. It should always, if possible, be learned at an early age, as it is not acquired without some difficulty, and danger from falls. There are several regularly established skating clubs in Great Britain, the members of which meet on some favourite sheet of ice, and perform graceful evolutions.

SKE'LETON (Gr. *skeletos*, dry) is the term applied in anatomy to designate the hard parts or framework of animals. In the invertebrate animals, the skeleton, except in the case of certain corals, is tegumentary or dermal, forming the outer hard and protective covering, as in the *Echinodermata*, *Mollusca*, and *Crustacea;* and like the epidermis and its appendages, is non-vascular, and can only be increased by additions to its edges. This hard insensible covering serves to protect the animal from hurtful external influences, and to afford fixed points of attachment to the muscles which move the body and limbs; the muscles, however, always lying interior to the skeleton, and not clothing it, as we see in the vertebrata. We scarcely ever observe, amongst the invertebrata, that

the skeleton bears any definite relation to the nervous system, which is merely protected by it to the same extent as the other soft tissues. Moreover, in none of these animals are the hard parts composed of true bone.

In the vertebrate animals, although we find occasional cases of bone being deposited in various parts of the body, its most constant position is around the central masses of the nervous and vascular systems, with rays extending thence into the middle of the chief muscular masses, forming the bases of the limbs. 'Portions of bone are also developed, to protect and otherwise subserve the organs of the senses, and in some species are found encasing mucus-ducts, and buried in the substance of certain viscera—as, e. g., the heart in the bullock and some other large quadrupeds. Strong membranes, called "aponeurotic," and certain leaders or tendons, become bony in some animals—as, e. g., the "tentorium" in the cat, the temporal fascia in the turtle, the leaders in the leg-muscles in the turkey, the nuchal ligament in the mole, and certain tendons in the abdominal muscles of the kangaroo, which, so ossified, are called the marsupial bones.'—Owen's *Structure of the Skeleton*, p. 163. In some animals (e. g., the sturgeon, the crocodile, the armadillo), bony matter accumulates upon or near to the surface of the body, rendering the skin in some cases absolutely ball-proof.

In order to give a clear conception of the osseous system, Professor Owen classifies its various parts according to their prevalent position. The superficial or skin bones constitute the 'dermo-skeleton' (Gr. *derma*, skin); the deep-seated bones, in relation to the nervous axis and locomotion, form the 'neuro-skeleton' (Gr. *neuron*, nerve); the bones connected with the sense-organs and viscera form the 'splanchno-skeleton' (Gr. *splanchnon*, a viscus or inward part); while those developed in tendons, ligaments, and aponeuroses are termed the 'sclero-skeleton' (Gr. *skleros*, hard). In the arrangement of the various parts of the dermo-, splanchno-, and sclero-skeletons, no definite plan or law can be detected. The definite end or purpose gained by the position of the bony plates, cases, or rods, belonging to these skeletons, is usually easily seen to be connected with the habits and well-being of the animals in which they occur, but the parts cannot be referred to one general type, as in the case of the neuro-skeleton. We will follow Professor Owen in taking the sturgeon and armadillo as examples of a dermo-skeleton, and shall condense the remarks which he makes on their outer covering. The head of the sturgeon is defended by a case of superficial bony plates, and the body by five longitudinal rows of similar plates, one extending along the mid-line of the back, one along each side of the body, and two along the belly, between the ventral and pectoral fins. These fishes habitually swim low and grovel along the bottom, turning up the mud and sand with their pig-like snout, and feeding on the decomposing organic substances carried down by strong and rapid currents. The heavy dermal osseous plates, regularly arranged in orderly rows along the middle and sides of the body, act as well-arranged ballast. The protection which their plate-armour affords them against the logs and stones hurried along their feeding-grounds, renders needless the ossification of the immediate case of the brain and spinal marrow, and, consequently, all the parts of the neuro-skeleton remain in the flexible, elastic, gristly state common to all the so-called cartilaginous fishes; the weight of the dermo-skeleton requiring that the neuro-skeleton shall be as light as possible, consistently with the defensive and sustaining functions which it is called to perform. The coat of mail in which the ganoid fishes of an early period were clothed, was probably subservient to the same ends as the dermal plates of the sturgeon; and in most of these fishes, as in the sturgeon, the dermal bones are coated externally with a very hard material resembling enamel. In these extinct fishes, the plates are more close-set than in the sturgeon, overlapping each other, and being fastened together like tiles by a peg of one entering a socket in the next, and conversely.

In the armadillo, the dermal bones are small, usually five or six sided, smooth internally, and variously sculptured externally—the pattern, however, being constant in, and characteristic of, each species. They are united together at their margins by rough surfaces, and collectively resemble a tesselated pavement. To allow of the requisite movements of the trunk of the armadillos, which have the power of rolling themselves into a ball, a certain number of transverse rows, marked in the figure, are interposed, having an elastic yielding attachment with one another, and with the anterior and posterior fixed parts of the trunk-armour; and by this arrangement, the head and limbs can be withdrawn beneath the central case, by the action of strong subcutaneous muscles. In the colossal extinct armadillo (the *Glyptodon*), the trunk-armour was not divided by bands, but was composed of one immovable piece, covering the back and sides—an arrangement by which the dermo-skeleton would afford increased protection against falling timber, the attacks of other animals, &c.

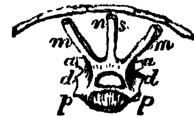


Fig. 1.—Transverse Section, showing portions of Dermo- and Neuro-skeleton of Armadillo.
(The signification of the letters is subsequently given.)

The splanchno-skeleton is at first sight less apparent than the dermo-skeleton. In most air-breathing vertebrates, the larynx, trachea, and bronchial tubes contain a cartilaginous framework, which sometimes becomes ossified; in fishes, and in the batrachians in the tadpole state, the gills are supported upon a cartilaginous or osseous framework, developed independently of the vertebral skeleton; and in many mammals, the heart contains a bone that serves as a support for its muscular and ligamentous fibres. If to these parts we add the so-called 'sense-capsules'—the bony cap which is found in the outer coat of the eye in many birds and most fishes; the hard bony envelope which surrounds the internal ear, and which subsequently, as the petrous portion of the temporal bone, becomes incorporated in most vertebrates with the neuro-skeleton; and the turbinate bones of the nose—and the teeth, we have the principal parts of the splanchno-skeleton. The sclero-skeleton requires no further explanation than that which has been already given; and we therefore proceed to what may be called the skeleton proper—the neuro-skeleton.

From the nature of the subject, it is impossible to avoid the introduction of a considerable number of technical terms, which will probably be new, and will sound somewhat harshly to many of our readers; and as few writers can popularise a difficult subject more successfully than Professor Owen himself (unquestionably the greatest osteologist of the present age), we shall for the most part follow the history of the neuro-skeleton which he drew up for the benefit of general readers in *The Circle of the Sciences*. A thoughtful examination of the skeleton of any vertebrate shews that it is arranged in a series of segments, following and

articulating with each other in the direction of the axis of the body, from before backwards in brutes, from above downwards in man. Each complete segment, called a 'vertebra,' consists of a series of osseous pieces arranged according to the plan shewn in figs. 2 and 3, so as to form a bony hoop or arch above a central piece, for the protection of a segment of the nervous axis; and a bony hoop or arch beneath the central piece, for the protection of a segment of the vascular system. The upper hoop, N, is called the 'neural arch' (Gr. *neuron*, a nerve), and the lower hoop, H, the 'hæmal arch' (Gr. *hæma*, blood); while their common centre, C, is termed the centrum. The neural arch is formed by a pair of bones, *n*, *n*, called 'neurapophyses' (Gr. *apophysis*, a projecting part or process), and by a bone, *ns*, sometimes cleft or bifid, called the 'neural spine;' it also sometimes includes a pair of bones, *d*, *d*, called 'diapophyses' (Gr. *dia*, across). The hæmal arch is formed by a pair of bones, *pl*, called 'pleurapophyses' (Gr. *pleuron*, a rib); by a second pair, *h*, called 'hæmapophyses;' and by a bone, *hs*, sometimes bifid, called the 'hæmal spine.' It also sometimes includes parts or bones called 'parapophyses' (Gr. *para*, transverse). Bones, moreover, are developed, which diverge as rays from one or more parts of a vertebra. Professor Owen divides the various parts of a vertebra into (1) the autogenous and (2) the exogenous parts. The autogenous parts are those which are developed from independent centres of Ossification (q. v.), and are termed the elements of the vertebra; while the exogenous parts are those that grow from parts previously ossified, and are termed processes. The line between these two sets of parts cannot be strictly drawn, since parts which are usually exogenous are sometimes autogenous, and *vice versâ*. The autogenous parts or elements are the centrum, C; the neurapophyses, *n*, *n*; the neural spine, *ns*; the pleurapophyses, *pl*, *pl*; the hæmapophyses, *h*, *h*, and the hæmal spine, *hs*; while the exogenous parts or processes are the

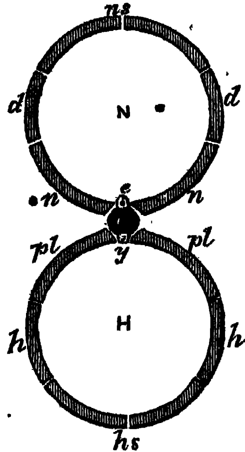


Fig. 2.—Typical Vertebra (ideal.)

(The signification of the letters is fully given in the text.)

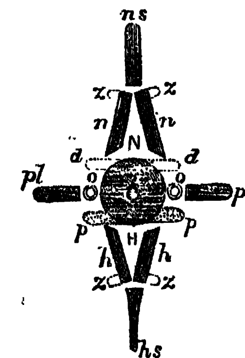


Fig. 3.—Another Modification of a Typical Vertebra:

C, the centrum, giving off *d*, *d*, the diapophyses, and *p*, *p*, the parapophyses; the neural arch N, enclosing the spinal cord, is formed by *n*, *n*, the neurapophyses, and *ns*, the neural spine; the hæmal arch H, enclosing the great centres of the circulation, is formed by *h*, *h*, the hæmapophyses, and *hs*, the hæmal spine. From both the neurapophyses and the hæmapophyses may be given off the zygapophyses, *z*, *z*. The lateral arches which may enclose the vertebral arteries, O, O, are completed by the pleurapophyses, *pl*.

diapophyses (fig. 3), *d*, *d*; the parapophyses (fig. 5), *p*, *p*; the zygapophyses (fig. 3), *z*, *z* (Gr. *zygos*, a junction); the anapophyses (fig. 1), *a*, *a* (Gr. *ana*, backwards); the metapophyses (fig. 1), *m*, *m* (Gr. *meta*, between); the hypapophysis (fig. 5), *y* (Gr. *hypo*, below); and the epapophysis (fig. 2), *e* (Gr. *epi*, upon). These individual parts may be united with each other in various ways, and may occur in various degrees of development; sometimes they (or some of them) remain entirely disjoined even in the adult animal, while in other cases they are united into a single piece, so that their real distinctness can only be recognised by tracing the history of their development. In most instances, some one or more of these parts will be found to be altogether deficient, while in other cases one set of parts is exaggerated to a great degree. Thus, in fig. 4, which exhibits the third or parietal segment of the human skeleton, the neural arch, N, is much expanded, while the hæmal one, H, is contracted; while more commonly, as is shewn in fig. 5, which represents a thoracic segment or vertebra of a raven, the hæmal arch, H, is much expanded, and the neural one, N, contracted; while sometimes, again, as in the tail of the crocodile and of many other animals, both neural and hæmal arches are simultaneously contracted. The segments are commonly simplified, and made smaller as they approach the end of the vertebral column or axis, one element or process after another being removed until the vertebra is reduced to its centrum, as in the diagram of the archetype vertebral skeleton. If we glance at the typical vertebra represented in fig. 3, we observe the diapophyses projecting above a canal that serves for the passage of a blood-vessel, and parapophyses which form the lower boundaries of this canal. These elements never attain any high development in mammals, birds, or reptiles; thus, in the human cervical vertebra, they form the two roots of the transverse process surrounding the foramen for the passage of the vertebral artery, while in the thoracic vertebra of the bird (see fig. 5) the diapophyses, *d*, *d*, form the transverse processes, and the parapophyses, *p*, *p*, reduced to mere rudiments, form the articular

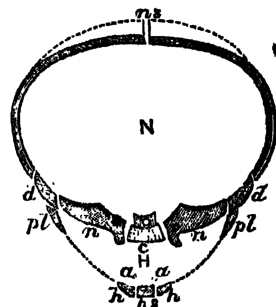


Fig. 4.—Parietal, or Third Segment or Vertebra of the Human Skeleton.

(Letters as in preceding diagrams.)

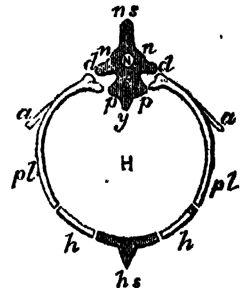


Fig. 5.—Thoracic Segment or Vertebra of a Raven.

(In this and the preceding figure, *a*, *a* are diverging appendages.)

surfaces with which the heads of the ribs come in contact. In fishes, however, they are much developed, and in the cod tribe are even larger and broader than the pleurapophyses or true ribs. The ordinary function of these lateral processes is to afford attachment to muscles, to protect the lateral vascular trunks (as in the case of the vertebral artery), and to give support to the pleurapophyses, *pl*, *pl*, whose development varies extremely in different parts of the same vertebral column, as well as in different animals. Then, in the human cervical vertebra (fig. 6), they form the short bifid transverse processes which are anchylosed at their base to the diapophyses and parapophyses which surround the vertebral canal. In the thoracic segments (fig. 5), they are developed separately, and

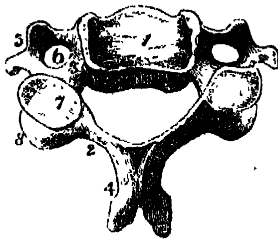


Fig. 6.—A Central Cervical Vertebra as seen from above: 1, the body; 2, the lamina; 3, the pedicle; 4, the bifid spinous process; 6, the vertebral foramen; 7, the superior articular process. This figure, as compared with the preceding ones, must be regarded as inverted, the neural arch being here below the centrum.

constitute the ribs which form the greater part of the circumference of the hæmal arch. Proceeding to the consideration of the parts below the centrum, we often find the entire hæmal arch wanting, as in the cervical and lumbar vertebræ of man and mammals; but in the tail of some mammals and of reptiles, a hæmal arch, protecting the caudal artery and vein, and closely resembling a neural arch, is found. It is in the thoracic region of mammals, birds, and reptiles that we find the greatest expansion of the hæmal arch (see fig. 5); the hæmapophyses here articulating with the extremities of the ribs instead of with the centrum, and the arch surrounding the entire visceral cavity. In man and mammals, the hæmapophyses remain unossified, and are known as the cartilages of the ribs; but in birds and reptiles, they are ossified, and constitute the sternal ribs. The hæmal spine, *hs*, presents great variety of form, and is often altogether absent. In the mammalian thorax, it occurs as a flat sternum; in birds, the flatness is replaced by a prominent keel on the mesial line, so that a transverse section almost resembles a neural spine; while in reptiles, again, the hæmal spine or sternum is flattened laterally, as in mammals. The hæmapophyses and hæmal spine are absent in the abdominal region of mammals and birds, but are continued backwards in the saurians or lizard-like reptiles, whose hæmal arch is, notwithstanding, incomplete, from the absence of pleurapophyses. In serpents, the hæmal arches are wanting through the whole trunk, the ends of the ribs being free; and in fishes generally, the hæmapophyses and hæmal spine are absent, or unossified.

Having noticed, as fully as our space permits, the modifications which the typical vertebra undergoes in various animals, and in different parts of the same animal, we now come to the more difficult subject of 'the archetype vertebrate skeleton,' which is made up of a series of vertebræ arranged in a continuous row. The accompanying scheme or diagram represents Professor Owen's conception of the common pattern or archetype of the vertebrate skeleton. It is difficult at first sight to see any resemblance between this figure and the human skeleton; but, in fact, the human skeleton, of all

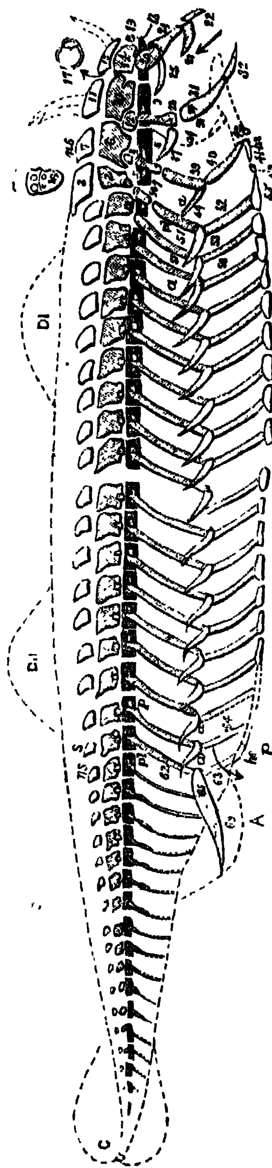


Fig. 7.—Diagram of Archetype Vertebrate Skeleton, composed of the following parts: 1, Basioccipital; 2, Exoccipital; 3, Supraoccipital; 4. Paroccipital, constituting the neural arch of the first or occipital vertebra of the head (the epencephalic arch); 5, Basisphenoid; 6, Alisphenoid; 7, Parietal; 8, Mastoid, constituting the neural arch of the second or parietal vertebra (the mesencephalic arch); 9, Presphenoid; 10, Orbitosphenoid; 11, Frontal; 12, Post-frontal, constituting the neural arch of the third or frontal vertebra (the prosencephalic arch); 13, Vomer; 14. Prefrontals; 15, Nasal, constituting the neural arch of the fourth or nasal vertebra (the rhinencephalic arch); 16, Petrosal or acoustic sense-capsule; 17, Sclerotic, or ophthalmic sense-capsule; 19, Ethmo-turbinal, or olfactive sense-capsule;—20, Palatine; 21, Maxillary; 22. Premaxillary, constituting the maxillary hæmal arch; 25, 27, being its diverging appendages;—28, Tympanic; 29–32, Mandibular or lower jaw, constituting the mandibular hæmal arch; 34, 37, Operculars, being the diverging appendages of this arch;—38, Stylohyal; 39, Epihyal; 40, Ceratohyal; 41, Basihyal; 42, Glossohyal; 43, Urohyal, constituting the hyoidean hæmal arch; 44, Branchiostegal, being its diverging appendages; 50, Supra-scapula; 51, Scapula; 52, Coracoid; 52', Episternum; 53, Anterior member, constituting the scapular hæmal arch, with its diverging appendages; 58. Clavicle;—62, Ilium; 63, Ischium; 64, Pubis, the hæmapophysis of one of the lumbar vertebræ; 65, 69, Posterior extremity, constituting the hæmal arch of the sacral vertebra skeleton, with its diverging appendages.

others, recedes the furthest from the common pattern; and if we turn to fishes, which were the first form of vertebrate life introduced into this planet, we find that they deviate the least from the archetypal idea. If proof be demanded that a given bone in the human skull is an element of a particular vertebra, it is afforded by tracing the same bone through its various modifications in mammals, birds, reptiles, and fishes, till the simple archetypal form is arrived at. The skull is found to be but a continuation of the backbone, and to consist of four vertebræ or segments, corresponding to the four consecutive enlargements of the nervous system which we call the brain. These segments, reckoning them

from behind forwards, are termed the occipital, the parietal, the frontal, and the nasal segment. Each segment consists of a neural and a hæmal arch.

The Neural Arches are:

N. I. Epencephalic Arch (bones Nos. 1, 2, 3, 4 in figure). N. II. Mesencephalic Arch (bones Nos. 5, 6, 7, 8 in figure). N. III. Prosencephalic Arch (bones Nos. 9, 10, 11, 12 in figure). N. IV. Rhinencephalic Arch (bones Nos. 13, 14, 15 in figure).

The Hæmal Arches are:

H. I. Scapular Arch (Nos. 50—52). H. II. Hyoidean Arch (Nos. 38—43). H. III. Mandibular Arch (Nos. 28—32). H. IV. Maxillary Arch (Nos. 20—22).

The jaws are the modified hæmal arches of the first two segments; and the mouth opens at the interspace between these arches. The position of the vent varies (in fishes), but always opens behind the pelvic arch, S 62, 63, *p*, where this is ossified. Outlines of the chief ossified developments of the dermo-skeleton, in different vertebrates, are added by Professor Owen to the neuro-skeletal archetype; as, for example, the median horn, supported by the nasal spine, 15, in the rhinoceros; the pair of lateral horns developed from the frontal spine, 11, in most ruminants; the median folds, DI, DII, above the neural spines, one or more in number, constituting the dorsal fin or fins in fishes and cetaceans, and the dorsal hump or humps in the buffaloes and camels; similar folds are sometimes developed at the end of the tail, constituting the caudal fin, C, and the anal fin or fins, A, of fishes.

It has been already remarked, that bones which diverge as rays are formed from one or more parts of a vertebra. These 'diverging appendages' are mainly connected with the hæmal arches, and those which especially concern us are the pectoral appendages of the scapular arch, which become developed into fore-limbs or arms (54—57, fig. 9), and the pelvic appendages which are attached to their supporting hæmal arch, 63, *hs*. If we examine the skull of a cod-fish, in which the bones have been arranged

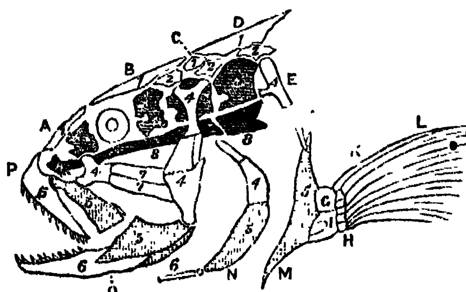


Fig. 8.

1, neural spines.	A, nasal vertebra.
2, diapophyses of the three posterior vertebræ	B, frontal vertebra.
3, neurapophyses.	C, parietal vertebra.
4, pleurapophyses.	D, occipital vertebra.
5, hæmapophyses.	E, supra-scapula.
6, hæmal spine.	F, scapula.
7, appendage proceeding from the pleurapophysis of the first arch to that of the second, and corresponding to internal pterygoid plate in man.	G, ulna.
8, centra.	H, carpus.
	I, radius.
	K, metacarpus.
	L, phalanges.
	M, scapular arch.
	N, hyoidean arch.
	O, inferior maxillary arch.
	P, superior maxillary arch.

according to the segments or vertebræ to which they belong, we observe that the occipital vertebra has a widely expanded hæmal arch, consisting of three pairs of bones with diverging appendages. The special names given by Owen to the various elements of that hæmal arch, from above downwards, are 'suprascapular,' No. 50; 'scapula,' No. 51; 'coracoid,' No. 52. The scapular arch thus formed supports and protects the heart or centre of the hæmal system, and in most fishes supports the pectoral fin, while in other animals the appendage that here becomes a fin is modified into a fore-leg, a wing, an arm, and a hand. Some of the special names originally employed in human anatomy are retained and applied to like parts in the pectoral fin of the fish; but it will be observed that Professor Owen designates each bone not only by a name but by a numeral. Of the two flat bones connecting the fin with the coracoid, the upper one is the 'ulna,' No. 54; the lower one, the 'radius,' No. 55; the row of short bones joined with these are the 'carpals,' No. 56; beyond which are the metacarpals and phalanges. Ascending from fishes to reptiles, we find that, in the lower batrachia (as the *amphiuma*), the scapulæ are detached from the occiput, and that other important modifications have occurred. The coracoids, *h* 52, are well expanded, three segments of the diverging appendage, *a*, are ossified, and two of these segments are bifid, shewing a simple beginning of the radiating multiplication of parts. The first segment is the seat of these modifications, which have acquired for it the special name of 'humerus,' 53; the two divisions of the next segment of the appendage are called 'ulnar,' 54, and 'radius,' 55; the gristly mass, 56, is the carpus, and the two bony divisions are the digits or fingers, 57. We have here got so distinct a rudimentary arm, separated from the head, although, according to the views propounded in this article, an appendage of the occipital segment of the cranium, that it is unnecessary to trace the further modifications that ensue, which lead finally to the arm and hand of man. It is only necessary to remark, that in mammals, except amongst the non-placental orders, the coracoid bone is reduced to a mere rudiment, being known as a process of the scapula, and that its function—namely, that of keeping the shoulders apart—is performed by the clavicle, which, according to Owen, is the hæmapophysis (58) of the first cervical vertebra (see fig. 7). With regard to the pelvic arch, we have only space to add that it must be regarded as the hæmal arch of one or more of the pelvic vertebræ; and there is undoubted evidence to shew that the pelvic and scapular arches are constructed on the same plan; the 'ileum' answering to the scapula, the 'ischium' to the coracoid, and the 'pubis' to the clavicle; and the same remark applies to the pelvic and scapular appendages.

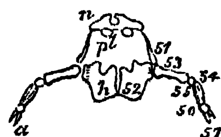


Fig. 9.—Posterior View of the Occipital Vertebra of *Amphiuma*:

n, neurapophyses; *pl*, 51, pleurapophyses of occipital vertebra or scapula; *h*, 52, hæmapophyses of occipital vertebra, or coracoid bone; *a*, 53—57, diverging appendages of occipital vertebra, or anterior limbs.

'Of this,' says Mr Holden, probably our best authority on human osteology, 'a student may rest assured, that however minutely he may have scrutinised the bones, he cannot understand them unless he knows something of the "vertebrate archetype." Without this knowledge, he is like one who speaks a language fluently, but is ignorant of its grammar. The "archetype" may be said to be the grammar of all osteology.'

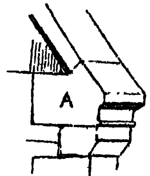
SKELLIGS, The, three rocky islands on the west coast of Ireland, about 8 miles west of Bolus Head, county Kerry, in long. 10° 32′ W. The lights on the Great Skellig are the first visible to ships crossing the Atlantic.

SKELTON, JOHN, an early English satirical poet, is supposed to have been born about the year 1460, but whether in Norfolk or Cumberland, is uncertain. He studied at both Cambridge and Oxford, and received from each the academical honour of laureate. His sovereign, Henry VII., appointed him tutor to the young Prince Henry, afterwards King Henry VIII.; and Erasmus, in allusion to his learning, styled him the light and grace of British scholars. At this time, S. had produced some translations, written elegies on Edward IV. (1483) and the Duke of Northumberland (1489), and was author of some stiff court masques and allegorical poems of little or no merit. He entered the church in 1498, and became rector of Diss in Norfolk, shortly after which he seems to have struck into that vein of original vernacular poetry, addressed to the multitude, for which he is unique among our elder bards, and which helped to fix our language. It consists in a flow of rattling voluble verse, unrestrained satire and jocularity, and a profusion of grotesque imagery mixed up with Latin and slang phrases. At times, S. has gleams of bright fancy and snatches of pleasant description. Of this higher class is his *Philip Sparrow*, being a poetical lamentation made by a young maiden (whose charms the poet describes with great gusto and minuteness) over the loss of a pet bird slain in a convent of black nuns at Carowe near Norwich. The most humorous of his pictures of 'low life—often coarse enough—are found in the piece entitled *The Tunning* [or Brewing] *of Elynor Rummyng*, an alewife at Leatherhead in Surrey. This poem was highly popular, and was often reprinted in black-letter, garnished with a rude woodcut representation of the fat hostess. His best satires are *Colin Clout*, and *Why come ye not to Court?* The former is a general satire on the clergy; and the latter, a virulent attack on Cardinal Wolsey, whom the unscrupulous poet had previously flattered, but who had disappointed him of a probend which he coveted. In this scurrilous lampoon, Wolsey is not only charged with arrogance, avariciousness, and incontinence, but is reminded of his 'base original' and 'greasy genealogy,' having been 'cast out of a butcher's stall.' The enraged cardinal ordered his libeller to be arrested, but S. took refuge in the sanctuary at Westminster, and received the protection of Abbot Islip. From this retreat he did not dare to emerge, but continued silent under its sacred shelter till his death in 1529. The 'pithy, pleasaunt, and profitable workes of Maister Skelton, Poete Laureate,' were collected and published in 1568, and reprinted in 1736. An edition, carefully edited by the Rev. A. Dyce, was issued in 1843, in 2 vols. 8vo.

SKE'RRIES, THE (Skerry is a term for any isolated sea-girt rock), small islands about 2 miles off the north-west coast of Anglesey, having a light-house 117 feet high. See also PENTLAND FIRTH.

SKE'RRYVORE is the chief rock of a reef which lies about 12 miles south-south-west of the south-west point of the island of Tiree (q. v.), and 24 miles west of Iona. This reef, which stretches from 8 to 10 miles in a west-south-west direction, is composed of compact gneiss, worn smooth by the constant action of the waves, and was long a terror to mariners, having caused the loss of one ship annually for forty years previous to 1844. The Northern Light-house Commission had long intended the erection of a light-house on S., the only point of this dangerous reef which could afford the needful foundation; but the difficulty of landing on the rock, from the immense force (three tons to the superficial foot) with which the Atlantic waves beat upon it, caused the delay of the scheme till 1834, when preparations were made in earnest. The design and superintendence of the construction of the building were intrusted to Mr Alan Stevenson, who commenced operations on the rock in 1838, following generally the mode adopted by his father, Mr Robert Stevenson (q. v.), in the construction of the Bell Rock (q. v.) Light-house, and in spite of occasional disasters from tempests, completed his work in 1844. The light-house is 138½ feet high; at the base 42 feet, and at the top 16 feet in diameter. The light, a revolving one, is produced by the revolution of eight large annular lenses round a lamp of four wicks, according to Fresnel's first dioptric system, and can be seen at a distance of 18 miles. The cost of erection was close upon £87,000. S. Light-house is nearly ⅔ths higher than that on the Bell Rock, and more than twice as high as the Eddystone. A small group of rocks belonging to this reef, and situated three miles westward of the light-house, is known as Stevenson's rocks.

SKEW, a sloping water-table—as on the set-off of a buttress, the cope of a gable, &c. This term is more generally used in Scotland than in England. The large stone (A) at bottom is called the skew-putt.



Skew.

SKEW-BRIDGE, a bridge placed obliquely so as to cross a road or river at an angle not a right angle. Such bridges, built of stone, are not easy of construction, owing to the peculiar twisted forms which the voussoirs assume, and were scarcely ever used till the necessities of railway curves compelled their introduction. They are evidently a great improvement on the old-fashioned mode of twisting a road, first to the right, and then to the left, in order to get the bridge at right angles to the place to be crossed. Since the introduction of iron girders as the supports of bridges, skew-bridges have become easy of construction, and are now quite generally used.

SKIBBEREE'N, a market-town of the county of Cork, Ireland, and situated in lat. 51° 34' N., long. 9° 16' W., distant from Cork 52 miles south-west. It is a place of little commerce, and almost entirely without manufactures. The pop., in 1861, was 3694, of whom 3238 were Roman Catholics.

SKID, in Military and Naval Language, is any timber which is used as a base to keep one object from resting on another. Thus, a row of cannon in store will be kept from the ground by skids.

The term is also applied to the drag which is put on the wheels of carriages in going up hills, to prevent rolling backwards.

SKI'DDAW, a mountain in Cumberland, near the centre of the county; height, 3022 feet. A few miles to the south lie Derwent Water and the town of Keswick.

SKIN. Considered in its general physiological and histological (or textural) relations, the skin is merely a part of the great mucous system to which the mucous membrane and secreting glands also belong, and which consists of two essential elements—a *basement tissue*, composed of simple cutaneous membrane, and an *epithelium* of nucleated particles resting on it—while beneath the basement membrane are vessels, nerves, and connective tissue. See EPITHELIUM and MUCOUS MEMBRANES. In the skin, the hard and thick epithelium is termed *cuticle* or *epidermis*, and the true skin below it is termed the *derma* or *cutis vera*, and is chiefly formed of modified and very dense connective (or areolar or cellular) tissue.

The external surface of the skin formed by the cuticle is marked by furrows of different kinds. Some (termed furrows of motion) occur transversely in the neighbourhood of joints, on the side of flexion; others correspond to the insertion of cutaneous muscles; while others, of quite another kind, are seen in aged and emaciated persons, and after the subsidence of any great distention of the integument; and besides these coarse lines, most parts of the skin are grooved with very minute furrows, which assume various courses in relation to one another. These minute furrows are most distinctly seen on the palmar aspect of the hand and fingers, and on the sole of the foot. The outer surface of the skin also presents innumerable pores for the discharge of the contents of the sudoriparous and sebaceous follicles, or the sweat and fat glands; and the modifications of epidermis known as hair and nails occur on the same surface.

The deep layer of the skin consists of connective tissue, in which both the white and yellow fibrous elements are considerably modified as to the proportions in which they occur, and smooth muscles are present in no inconsiderable quantity in some parts of the skin. Where great extensibility, with elasticity, is required, the yellow (elastic) element predominates; and where strength and resistance are specially required, as in the sole of the foot, the *cutis* is chiefly composed of a dense interweaving of the white (inelastic) element. The thickness and strength of this layer differ greatly in different parts, according to the amount of resistance required against pressure. The skin is thicker on the hinder surface of the body than in front, and on the outer than on the inner sides of the limbs. 'It is unusually thin over the flexures of the joints. It is particularly delicate in the eyelids, and proportionably so in some other situations where great mobility is demanded. In regions which are most subject to external pressure, as the soles of the feet, it is firmly united by very dense laminæ to the subcutaneous fascia; and the intervals between these are provided with pellets of fat, forming a cushion, as an additional means of protection to the delicate organs it encloses and covers. Amongst the lower animals, we may notice numberless examples of an analogous kind.'—Todd and Bowman's *Physiological Anatomy and Physiology of Man*, vol. i. p. 407. The blubber of the whale merely represents, in a very exaggerated form, the layer of fat which generally occurs in the subcutaneous areolar tissue of man and most animals, serving as a soft bed on which the skin may rest, and gives the appearance of plumpness and symmetry to the outline of the body. It is on the external surface of the cutis that the *tactile papillæ*, or true organs of touch, are developed.

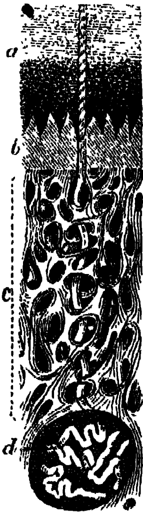


Fig. 1.—Vertical Section of the Skin of the Sole:

a, Cuticle; *b*, Papillary structure; *c*, *Cutis vera*, or true skin; *d*, Sweat-gland lying in a cavity on the deep surface of the skin, and imbedded in globules of fat. Its duct is seen passing to the surface. Magnified about 30 diameters.

Kölliker divides the true cutis into the 'reticular' and 'papillary' portions, the latter being the reddish-gray external superficial layer which contains the upper portion of the hair follicles and cutaneous glands, and whose most important element is these tactile papillæ. They are most abundant and largest in the palm of the hand* and the sole of the foot, while in the back and in the outer sides of the limbs, they are almost entirely absent. They occur as small, semi-transparent, flexible elevations (see *b*, in fig. 1), which are usually conical or club-shaped in form; but in certain parts, as the palm of the hand, present numerous points (in which case they are termed compound papillæ).

The thickness of the true skin varies, according to Kölliker, from ⅛th of a line to a line and a half. In its chemical characters, it agrees with those of the connective tissue, of which it is principally composed. The gelatine which it yields on boiling is derived mainly from the white fibrous tissue, and it is probably this element which is principally concerned in the changes which skin undergoes in the process of tanning. Arteries from the subcutaneous connective tissue freely enter into the structure of the skin, and are distributed to the fat-lobules, the sudoriparous and sebaceous glands (presently to be described), the hair follicles, the papillæ, &c. In these several parts, they terminate in a close network of capillaries. The two accompanying diagrams illus-

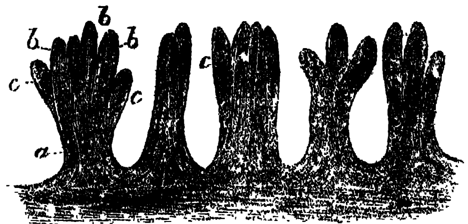


Fig. 2.—Compound Papillæ of the Surface of the Hand, with Two, Three, and Four Points:

a, Base of a papilla; *bb*, their separate processes; *cc*, Processes of papillæ when base is not visible. Magnified 60 diameters.

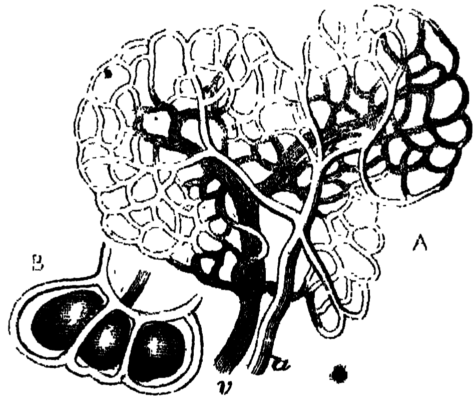


Fig. 3.—Blood-vessels of Fat:

A, Minute flattened fat lobule, in which the vessels only are represented; *a*, Terminal artery; *v*, Primitive vein. Magnified 100 diameters. B, Plan of arrangement of the capillaries on the exterior of the vesicles, more highly magnified.

* In one square line of the palm of the hand, E. H. Weber reckons that there are 81 compound, and from 150 to 200 smaller papillæ, arranged in tolerably regular rows.

trate the mode in which these capillaries are distributed over the fat-cells and in the papillæ. Those parts of the skin which border upon the epidermis are for the most part very freely provided with nerves, while in the deeper parts the



Fig. 4.—Arrangement of the Capillary Loops in the Skin.

nervous filaments are comparatively scanty. How they terminate, is still a subject of dispute; but the view most generally adopted is that they end in loops.

The glands occurring in the skin next claim our consideration. They are the *sudoriparous* or *sweat glands*, the *sebaceous* or *fat glands*, and the *ceruminous glands*. The *sweat-glands* exist in almost every part of the human skin. They lie in small pits in the deepest parts of the true skin, and sometimes entirely below the skin. Their orifices can be seen in the middle of the cross grooves that intersect the ridges of the papillæ on the hands and feet, their arrangement being here necessarily regular, while in other parts they are irregularly scattered. Their size and number in different regions of the skin correspond with the amount of perspiration yielded by each part; thus they are nowhere so much developed as in the axilla, or armpit. In that part of this region, which in the adult is more or less covered with hair, they form a layer of



Fig. 5.—Vertical Section of the Skin and Sweat-glands of the Axilla.

a, Layer of glands with their ducts traversing *b*, the cutis and cuticle; *c*, a small hair; *d*, *d*, Portions of larger hairs. Magnified one and a half diameter.

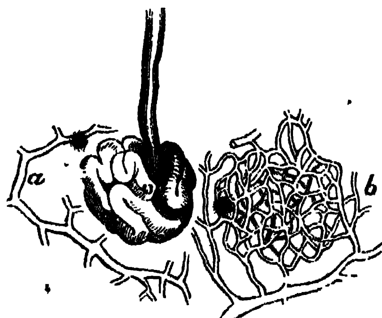


Fig. 6.—A Sweat-gland and the beginning of its Duct: *a*, Venous radicles on the wall of the gland; *b*, Capillaries. The vessels are all outside. Magnified 35 diameters.

a reddish colour, of about an eighth of an inch thick. They are soft, and more or less flattened by their pressure on one another, being imbedded in delicate connective tissue, and covered and permeated with a network of capillaries. On isolating one of these glands, and highly magnifying it, it is found to consist of a solitary tube, intricately ravelled, one end of which is closed, and hidden within the glandular mass, while the other emerges from the gland. The wall of the tube consists of an outer or *basement membrane*, with which the blood-vessels are in contact, and an *epithelium*, lining the interior, the former disappearing when the tube reaches the surface of the papillæ. The duct, on leaving the gland, follows a meandering and rather spiral direction through the reticular portion of the cutis to the interval between the papillæ, when it becomes straight; and it again assumes a spiral course in perforating the cuticle (see fig. 1). It is not easy to explain how or why so beautifully regular a spiral form should be given to the cuticular portion of the duct, which is rather wider than the rest, the average diameter of the duct being $\frac{1}{1700}$th of an inch.

The *sebaceous glands* are small whitish glands, which exist in almost every part of the skin, except the palms and soles, and are especially abundant in the scalp, face (the nose being particularly rich in

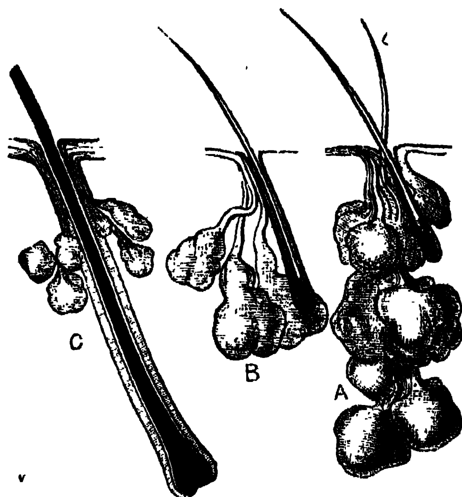


Fig. 7.—Sebaceous Glands, shewing their Size and relation to the Hair Follicles.

A and B, From the nose; C, From the Beard. Magnified 18 diameters.

(With two exceptions, the diagrams in this article are borrowed from Todd and Bowman.)

them), and about the anus. They are usually connected with the hairs, as shewn in fig. 7, and consist of a duct terminating in a blind pouch-like or pear-shaped extremity. The *basement membrane* of these glands is lined by an epithelium, in the particles of which are included granules of fatty or sebaceous matter, which, having become detached, constitutes the secretion. These glands are the seat of the parasite known as *Acarus folliculorum*.

The *ceruminous glands* are brown simple glands, in external appearance like the sudoriparous glands, occurring in the cartilaginous portion of the external meatus of the ear. They yield an adhesive bitter secretion, which protects the membrane of the tympanum from the access of dust, insects, &c.

We shall conclude by taking a brief survey of the functions of the skin, omitting, however, its most important function, TOUCH (q. v.). Regarded as a protective covering, the skin possesses the combined

advantages of toughness, resistance, flexibility, and elasticity; the connective framework being the part which mainly confers these properties, although the epidermis co-operates with it. The subcutaneous layer of fat, and the modifications of epidermis in various forms, as hairs, wool, feathers, scales, &c., serve for the preservation of warmth, and occasionally (when they occur as claws, talons, &c.) as means of offence or defence. The skin is the seat of a twofold excretion—viz., of that formed by the sudoriparous glands, and that formed by the sebaceous glands. The fluid secreted by the sudoriparous glands is usually formed so gradually that the watery portions of it escape by evaporation as soon as it reaches the surface; but in certain conditions, as during strong exercise, or when the external heat is excessive, or in certain diseases, or when the evaporation is prevented by the application of a texture impermeable to air, as, for example, oiled silk, or the material known as mackintosh, or india-rubber cloth, the secretion, instead of evaporating, collects on the skin in the form of drops of fluid. When it is stated that the sweat contains urea, lactates, extractive matters, &c., and that the amount of watery vapour exhaled from the skin is, on an average, 2½ lbs. daily (according to Valentin's observation), the importance of the sudoriparous glands as organs of excretion will be at once manifest. Moreover, there is reason to believe, from the experiments of Scharling, Gerlach, and others, that the importance of the skin as a *respiratory* organ is far from inconsiderable, very appreciable quantities of carbonic acid being exhaled hourly by the external surface of the body. In the amphibia, in which the skin is thin and moist, the cutaneous respiration is extremely active; and that the respiratory function of the skin in the higher animals is also considerable, is proved not only by measuring the excreted carbonic acid, but by the fact, that if the skin is covered with an impermeable varnish, or if the body be enclosed, all but the head, in a caoutchouc dress, animals soon die, as if asphyxiated, their heart and lungs being gorged with blood, and their temperature before death gradually falling many degrees. The secretion of the sebaceous glands is a semi-fluid oily mass, which often solidifies into a white viscid tallow-like matter on the surf› or ı the glandular ducts, from which it can be removed by pressure, in a form resembling that of a small whitish worm or maggot. Under the microscope, cells containing fat, free fat mixed with epidermic scales, and sometimes crystals of cholesterin, are observed. Its chemical constituents, in addition to water, are a peculiar nitrogenous matter resembling casein, fat (consisting of palmitin and olein, soaps composed of palmitic and oleic acids), cholesterin, earthy phosphates, and chlorides and phosphates of the alkalies. Its purpose seems to be that of keeping the skin moist and supple, and by its oily nature, of hindering too rapid evaporation. Moreover, considered as an excretion, it must take a share in the purification of the blood.

The skin is, moreover, an organ of absorption: mercurial preparations, when rubbed into the skin, have the same action as when given internally. Potassio-tartrate of antimony, when rubbed into the skin in the form of ointment or solution, may excite vomiting, or an eruption extending over the whole body; and many other illustrations might be given. The effect of rubbing is probably to force the particles of the matter into the orifices of the glands, where they are more easily absorbed than they would be through the epidermis. It has been proved by the experiments of Madden, Berthold, and others, that the skin has the power of absorbing water, although to a less extent than occurs in thin-skinned animals, such as frogs and lizards. This fact has a practical application. In severe cases of dysphagia —difficult swallowing—when not even fluids can be taken into the stomach, immersion in a bath of warm water, or of milk and water, may assuage the thirst. Sailors, also, when destitute of fresh water, find their urgent thirst allayed by soaking their clothes in salt water, and wearing them in that state.

The *diseases* of the skin, and their classification into genera and species, have occupied the attention of many of the most eminent physicians during the last century; but none of the proposed classifications are very satisfactory. The more important affections are noticed in special articles.

SKIPS, large square baskets, lined with leather or skin, used in spinning-mills for carrying the bobbins of yarn; sometimes they are made entirely of thick hides. Wood or basket work would be apt to catch and break the delicate threads.

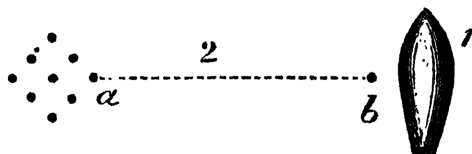
SKI'PTON, a market-town of England, county of York, is finely situated in a broad and fertile valley, near the river Aire, about 38 miles west of York, and 16 north-north-west of Bradford. S. carries on manufactures of cotton and woollen goods, and is a station on the Leeds and East Lancashire Railway. Pop. (1861) 4533.

SKI'RMISHERS are soldiers operating in loose array, two together—i. e., front and rear, with a lateral distance of about six paces between the files. When the army advances, the ground in front, and for some distance on each flank, is usually covered by skirmishers, to prevent surprise. If cavalry come suddenly on them, they rush together, and form small squares, called rallying squares. Skirmishers fire independently at their own discretion; but the rule is, that one of the two men composing a file should always have his rifle loaded. Orders are communicated by the sound of bugle.

SKI'RRET (*Sium Sisarum*), a perennial plant of the natural order *Umbelliferæ*, a native of China and Japan, but which has long been cultivated in gardens in Europe for the sake of its roots, which are tuberous and clustered, sometimes 6 inches long, and of the thickness of the finger. They are sweet, succulent, and nutritious, with a somewhat aromatic flavour, and when boiled, are a very agreeable article of food. A kind of spirituous liquor is sometimes made from them. Good sugar can also be extracted. S. was at one time more cultivated in Britain than it is at present, although there seems to be no good reason for its having fallen into disrepute. It is propagated either by seed or by very small offsets from the roots. It has a stem of 2—3 feet high; the lower leaves pinnate, with oblong serrated leaflets, and a heart-shaped terminal leaf, the upper ones ternate with lanceolate leaflets.

SKI'RTING, the board round the bottom of the walls of rooms. When large, it is called a base-plinth.

SKI'TTLES, a game very popular in England



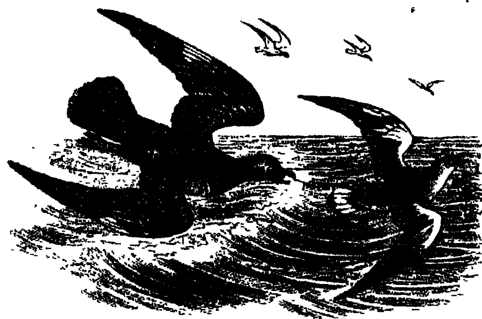
Skittles.

amongst the frequenters of public-houses. It is usually played in a covered shed, called a skittle

alley, about 60 feet in length. The skittles are made of hard wood of the shape shewn in fig. 1, and they are placed upon the floor of the shed in the order shewn in fig. 2, *a*. The player, standing at *b*, throws a wooden ball, and tries to knock down the whole of the skittles in a given number of throws. The rules of the game vary in different places. It is sometimes called 'Ninepins,' from the number of skittles used.

SKOPI'N, a town of Russia, government of Riazan, and 160 miles south-east of Moscow, is situated on the Verda, a tributary of the Oka, which is itself a tributary of the Volga. It has manufactures of Russian leather, and a trade in corn and cattle. Pop. (1855) 11,217.

SKU'A, or **SKUA GULL** (*Lestris*), a genus of birds of the family *Laridæ*, also known by the name JÄGER (Ger. hunter), and differing from the gulls in having the upper mandible more hooked at the tip, and the nostrils larger and further forward in the bill, the base of which is covered with a cere. The skuas are bold and powerful birds, and generally obtain their food by pursuing gulls or terns, and causing them to disgorge the fish which they have captured, which they dart upon and seize in the air. They also eat eggs and small birds. The COMMON S. (*L. cataractes*) is fully two feet in length,



Common Skua (*Lestris cataractes*), in pursuit of a Gull.

of a brown colour, with lighter streaks on the head and neck. It inhabits the northern seas, and breeds in some of the Shetland isles.

SKULL. The skull is divided into two parts, the cranium and the face. In human anatomy, it is customary to describe the former as consisting of eight, and the latter of fourteen bones; the eight cranial bones, which constitute the brain-case, being the *occipital, two parietal, frontal, two temporal, sphenoid*, and *ethmoid*; while the fourteen facial bones are the *two nasal, two superior maxillary, two lachrymal, two malar, two palate, two inferior turbinated, vomer*, and *inferior maxillary*. The bones of the ear, the teeth, and the Wormian bones are not included in this enumeration. The morphologist, however, who wishes to trace out the fundamental similarity of type in the structure of the various modifications of the vertebrate skull, will not be content with this arrangement, in which, as, for example, in the occipital, temporal, and sphenoid bones, the human anatomist considers as a single bone an osseous mass consisting primarily in man, and persistently in some of the lower vertebrates, of several distinct pieces or elements. Postponing to the close of this article any remarks on the structure of the vertebrate skull generally, we shall proceed to notice the ordinary anatomical relations of the human skull. The development of the skull is a subject of great interest, not only in itself, but as throwing light on many points which the study of the adult skull would fail to explain. At a very

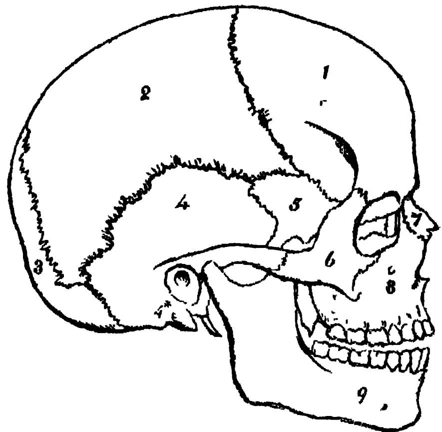


Fig. 1.—Side-view of Human Skull:
1, Frontal bone; 2, Parietal bone; 3, Occipital bone; 4, Temporal bone (squamous portion); 4*, Do. (mastoid portion); 5, Sphenoid bone; 6, Malar bone; 7, Nasal bone; 8, Superior maxillary or jaw bone; 9, Inferior maxillary or jaw bone.

early period of fœtal existence, the cerebrum is enclosed in a membranous capsule external to the dura mater, and in close contact with it. This is the first rudiment of the skull, the cerebral portion of which is consequently formed before there is any indication of a facial part. Soon, however, four or five processes jut from it on either side of the mesial line, which grow downwards, incline towards each other, and unite to form a series of inverted arches, from which the face is ultimately developed. Imperfect development or ossification of these rudimentary parts of the face gives rise to the peculiarities known as 'hare-lip' and 'cleft-palate,' or in very extreme cases to the form of monstrosity termed 'Cyclopean,' in which, from absence of the frontal processes, the two orbits form a single cavity, and the eyes are more or less blended in the mesial line.

The following is a brief summary of the succession of events that occur in the ordinary or normal development of the skull. Cartilage is formed at the base of the membranous capsule, which has been already described as thrown round the brain, and capable of enlarging with it. This is speedily followed by the deposition of ossific matter at various points of the capsule, which soon becomes converted into flakes of bone, which afford protection for the brain, while the intervening portions, which remain membranous, permit the skull to expand as its contents enlarge. The formation of these bony flakes on the convexity of the cranium is soon followed by the appearance of osseous nuclei in the cartilage at the base, corresponding to the future occipital and sphenoid bones. Lastly, the various bones, some originating in membrane, and some in cartilage (as described in the article OSSIFICATION), approach one another by gradual enlargement, and become united in various ways, so as to form a continuous, and ultimately an unyielding bony case, which, in the words of Dr Humphry, 'is admirably adapted for the defence of the brain, for the accommodation of the organs of special sense, and for the attachment of the ligaments and muscles by which the skull is supported and moved on the spine.'—*The Human Skeleton*, p. 185. At the period of birth,

most of the principal bones have grown into apposition with their neighbours, forming the *Sutures* (q. v.), but one large vacuity remains at the meeting-point of the parietal and frontal bones, which is termed the anterior fontanelle,* which does not close

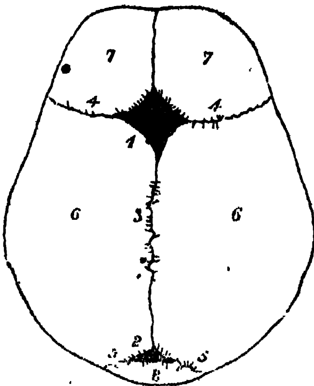


Fig. 2.
1, Anterior fontanelle; 2, Posterior fontanelle; 3, Sagittal suture; 4, 4, Coronal suture; 5, Lambdoidal suture. 6, 6, Parietal bones; 7, 7, Two halves of the frontal bone, still ununited; 8, Occipital bone.

till the second year after birth, and sometimes remains open much longer. The deficiency of the osseous brain-case at this position not only facilitates the act of delivery, but also acts, according to Humphry, to some extent like a safety-valve during

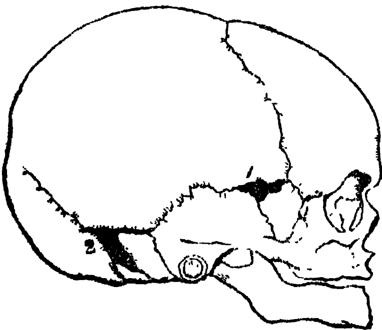


Fig. 3.
1, 2, Lateral fontanelles.

the first months of infantile life, at which time the brain bears an unusually large proportion to the rest of the body, and is liable to sudden variations of size from temporary congestion, sudden wasting of its substance, and other causes. The sutures remain distinct long after the closure of the fontanelles, and probably serve a purpose both in permitting an increase of the size of the cranium by the growth of the bones at their edges (although the enlargement of the cranial cavity does not entirely depend upon this growth at the edges), and in diminishing and dispersing vibrations from blows, and thus contributing to the security of the brain.

The number of centres of ossification in the skull is tolerably constant; each bone having a certain number. (Thus, the occipital has 7 centres, the temporal 5, the sphenoid 12, &c.; the total number being about 59.) In addition to these, centres frequently occur in the course of the sutures, giving rise to independent pieces, which are called the *ossa triquetra*, or the *Wormian bones*. They are regarded by Humphry as stop-gaps, developed in the membranous covering of the brain, when the extension of the regular osseous nuclei is likely, for some reason, to be insufficient to cover in the cranial cavity; and this view is supported by the observation that, in cases of rickets and hydrocephalus, the Wormian bones are especially abundant.

After the sutures have been formed, and the skull has acquired a certain thickness, a process of resorption commences in the interior of the bones, and reduces the originally dense structure to a more or less cellular or cancellated state. The interior thus altered is called the *Diploë*, and by this change the weight of the skull is much diminished, while its strength is scarcely affected.

The diploë usually begins to be apparent about the tenth year, and is most developed in those skulls which are thickest. Dr Humphry has observed it to be especially thick in idiots, and where the brain is small. 'Hence,' he observes, 'the propriety of the term *thick-headed*, as a synonym for *stupid*, derives some confirmation from anatomy.' A continuation of the same process of resorption, which causes the diploë, gives rise to the formation of the cavities known as the frontal and sphenoid sinuses. The formation of the diploë divides the walls of the cranium into three layers, viz., an outer tough layer; an inner dense, brittle, and somewhat glass-like layer, known as the vitreous table or layer; and the intervening cancellous diploë. The vitreous table being more brittle than the outer layer, is apt to be fissured to a greater extent in fracture of the skull; and is even sometimes broken while the outer layer, which received the blow, has remained entire; although the diploë must have great power in lessening the concussions transmitted from the outer to the inner layer of the skull. The growth of the skull after the seventh year proceeds slowly, but a slight increase goes on to about the age of twenty. The skull-bones are freely supplied with blood from arteries which pass from the dura mater internally and the pericranium externally, through the numerous foramina observed on both surfaces; the blood being returned by veins which take various directions.

The fact that concussion of the brain scarcely ever proves fatal, unless there is also fracture of the skull, affords the most distinct evidence that the skull is constructed in such a manner that so long as it maintains its integrity, it is able to protect its contents from serious lesion. This marvellous protective power is due to its rounded shape, whereby its strength is increased, and in consequence of which blows tend to glide off it, without doing material damage. Moreover, the curved lines or ridges which may be traced round the skull tend to strengthen it. The weakest part of the skull is at the base. Hence, notwithstanding its removal from exposure to direct injury and the protection afforded by the soft parts, fracture takes place more frequently at the base than at any other part of the skull, fracture often taking place here even when the skull was not broken at the part struck. There are two points in the architecture of the bones of the face which deserve especial notice, viz. (1), the great strength of the nasal arch, and (2) the immobility of the upper jaw, which is fixed by three buttresses, the nasal, the zygomatic, and the pterygoid.

* So called from the pulsations of the brain, which may be here seen resembling the rising of water at a spring or fountain. There are two fontanelles in the mesial line, as shewn in fig. 2, and two lateral fontanelles on either side, as shewn in fig. 3.

The base of the skull, whether seen from within or from below, presents many objects of physiological interest, in relation to the nervous system. As seen

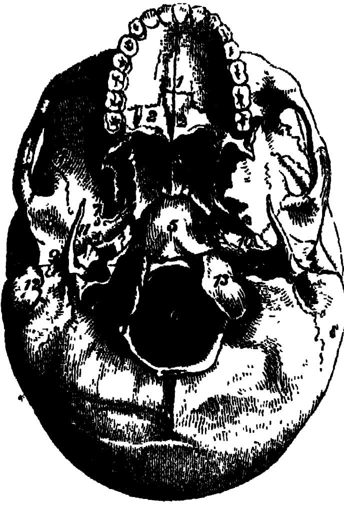


Fig. 4.

1, 1, Hard palate, formed by the palate processes of the superior maxillary bone; 2, 2, Palate bones; 3, Vomer, dividing the openings of the posterior nostrils; 4, Zygomatic fossa; 5, Basilar process of the occipital bone; 6, Foramen magnum, through which the spinal cord passes; 7, Foramen ovale; 8, Glenoid fossa, in which the head of the lower jaw-bone lies; 9, External auditory foramen; 10, Carotid foramen of the left side; 11, Styloid process; 12, Mastoid process; 13, One of the condyles of the occipital bone.

from within, the base presents on each side three fossæ, corresponding to the anterior and middle lobes of the cerebrum and to the cerebellum. These fossæ are marked, as is the whole skull-cap, by the cerebral convolutions, and they contain numerous 'foramina' and 'fissures' which give passage to various sets of nerves and blood-vessels. The external or outer surface of the base of the skull, if we consider it from before backwards, is formed by the palate processes of the superior maxillary and palate bones; the vomer; the pterygoid and spinous processes of the sphenoid and part of its body; the under surface of the temporal bones, and by the occipital bone. The most important of the parts which it presents are named in the description of fig. 4.

The anterior region of the skull, which forms the face, is of an irregularly oval form, and the bones are so arranged as to enclose the cavities for the eyes, the nose, and the mouth, and to give strength to the apparatus for masticating the food. The size of the face and the capacity of the cranial cavity stand in an inverse ratio to one another, as may be readily seen by comparing vertical sections (through the mesial line) of human and other mammalian skulls; and if, in place of mammalian skulls, we take skulls of lower vertebrates (the crocodile, for example), this ratio is far more striking. In man, the face is at its *minimum* as compared with the cranial cavity, chiefly in consequence of the facial bones being arranged in a nearly vertical manner beneath the cranium, instead of projecting in front of it. The human face is also remarkable for its relatively great breadth, which allows the orbits for the reception of the eyes to be placed in front instead of on the sides of the head, and renders their inner walls nearly parallel. 'This parallelism,' says Dr Humphry, 'in man is associated with the parallelism of the optic axes, and contributes to that clear, accurate, and steady vision which results from the ready convergence of the eyes upon every object.' Each orbit is of a pyramidal form, with the apex behind, and is composed of seven bones—viz., the frontal, ethmoid, lachrymal, sphenoid, superior maxillary, malar, and palate, which last contributes very slightly to the human orbit, but is an important constituent in the orbit of many animals. The nasal cavities have been sufficiently described in the article NOSE.

The different varieties of mankind present certain well-marked and characteristic peculiarities in the form of the skull. There are *three typical forms* of the skull which seem to be well established from the examination and comparison of a large number of crania—viz., the *prognathous*, the *pyramidal*, and the *oval* or *elliptical* cranium. When the upper jaw slopes forward, the insertion of the teeth, instead of being perpendicular, is oblique. A skull with this peculiarity is *prognathous* or *prognathic* (Gr. *pro*, forwards, and *gnathos*, a jaw); the opposite condition being termed *orthognathous* or *orthognathic* (Gr. *orthos*, upright). The Negro of the Guinea Coast and the Negrito of Australia present the prognathous character in its most marked form. The pyramidal form is characterised by the breadth and flatness of the face, which with the narrowness of the forehead, gives this shape to the head. The Mongolian and

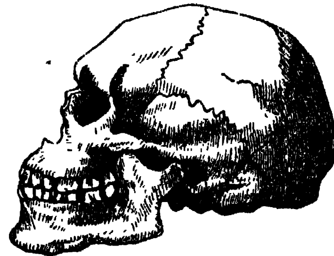


Fig. 5.—Prognathous Skull of a Native Australian.

Esquimaux skulls belong to this type. The oval or elliptical type is that which is presented by the natives of Western or Southern Europe, and which is not distinguished by any particular feature so much as by the absence of the longitudinal projection of the first type, or the lateral projection of the second, and by a general symmetry of the whole configuration. The length of the skull, which to a great degree corresponds to the degree of development of the posterior cerebral lobes, has been taken by the late Professor Retzius as a basis of classification. He arranges all the varieties of mankind into two great classes—the *Dolicocephalæ*, or *long-heads*, whose cerebral lobes completely cover the cerebellum; and the *Brachycephalæ*, or *short-heads*, in whom the cerebral lobes do not extend so far. Each of these classes contains *orthognathous* and *prognathous* varieties. See ETHNOLOGY.



Fig. 6.—Pyramidal Skull of Mongolian Race.

It has been already stated in the article SKELETON that the skull is only the anterior prolongation of the backbone, and that it consists of four vertebræ or segments, corresponding to the four consecutive enlargements of the nervous system which ultimately

form the brain—viz., the *Rhinencephalon*, the *Prosencephalon*, the *Mesencephalon*, and the *Epencephalon*—embryonic segments giving rise to the nerves of smell, sight, taste, and hearing. These four vertebræ, taken from behind forwards, are termed the Occipital, the Parietal, the Frontal, and the Nasal vertebræ. For the anatomical evidence by which these cranial vertebræ are resolved into the essential elements of a vertebra, as described in the article SKELETON, we must refer to Professor Owen's various works on the Skeleton, or to the admirable summaries of them contained in Humphry *On the Human Skeleton* (for which we are indebted to many of the details introduced into this article), and to Holden's *Human Osteology*. There has been much discussion as to who originated 'The Theory of the Vertebrate Skull.' The claim undoubtedly rests between Goethe, the great poet, and Oken, one of the most original and distinguished comparative anatomists of the early part of the present century. We believe the truth to be that the idea of the true nature of the skull flashed across the poet's mind in 1790, but that nothing definite was published on the subject till 1807, when Oken independently arrived at and promulgated similar views. Our limited space has prevented us from noticing the skull of birds, reptiles, or fishes. On these subjects, the reader is referred to Huxley's *Lectures on Comparative Anatomy*, 1864, in which the structure and development of the human skull, as well as the skulls of all the lower vertebrate animals, are most copiously and philosophically discussed.

Fracture of the skull is an accident of such importance as to demand a special paragraph. As already remarked, fracture may take place either in the vault or at the base of the skull. We shall first consider *fractures of the vault.* Here the fracture is usually direct, the bone giving way at the point at which it was struck, and the result being either a simple fissure, or a breaking of the bone into several fragments (a comminuted fracture). Although fractures may be limited to the outer or to the inner surface of the skull, they most commonly extend through the whole thickness, and the broken bone is generally driven inwards; and the most ordinary form of fracture with depression is that in which several fragments of a somewhat triangular form have their point driven down and wedged into each other, while their bases remain on a level with the surrounding bone. There are no signs by which we can in all cases recognise the existence of fracture of the vault. 'Fissures,' says Mr Prescott Hewett, 'involving the whole thickness of the vault of the skull, constantly exist without ever having been suspected during life; and even an extensive and comminuted fracture, with great depression of the fragments, may, and often does, escape notice when the broken bone lies hidden under the temporal muscle, or under a large extravasation of blood.'—Holmes's *System of Surgery*, vol. ii. p. 116. When, however, the fracture is accompanied by a wound leading down to the bone, it may, in general, be easily detected. With regard to treatment, it is now an established rule, that 'simple fractures of the skull with depression, and without symptoms, are to be left alone. The depression may be so marked as to be easily detected; and yet so long as there are no symptoms, all operative interference, of whatsoever form, is carefully to be avoided.'—Prescott Hewett, *op. cit.* If, however, there be a wound leading down to the bone in a depressed fracture without symptoms, immediate operative interference is called for. When a depressed fracture is accompanied by primary brain-symptoms, an operation for the purpose of raising or removing the depressed fragments is usually necessary. If, however, the fracture is a simple one, and the symptoms are not urgent, milder remedial agents, as bleeding, purging, and low diet, may be first tried. Cases occasionally occur in which very urgent symptoms of cerebral pressure persist for a long time, and are relieved at once on the pressure being removed. A remarkable case is recorded by Cline (*Medico-Chir. Rev.*, vol. i. p. 471), in which a sailor remained in a state of unconsciousness for thirteen months in consequence of a wound causing fracture and depression of one of the parietal bones. Cline trepanned the part, and elevated the bone; and on the evening of the same day, the sailor sat up in bed, and though at first stupid and incoherent, soon became rational and well, upwards of a year having elapsed in which his life was a complete blank.

Fractures of the base may be direct or indirect, but in most cases are indirect, that is to say, the bones give way at a point remote from the seat of the blow, as has been already shewn. At certain parts, however, the bones of the base are so thin, that if direct pressure be brought to bear upon them, they readily give way. Thus, scissors, slate-pencils, tobacco-pipes, &c., have often been thrust into the skull through the orbits or the nostrils, and these wounds are very serious, from the readiness with which the brain may be thus injured. The only symptoms that can be depended upon as indicating a fracture of the base of the skull are connected either with an escape of the substance of the brain, or blood, or watery fluid, or with an injury done to the nerves as they emerge at the base. Out of 32 cases of fractured base observed by Hewett, bleeding from the mouth or nose occurred in 14, and bleeding from the ear in 15 cases. A copious watery discharge from the ear was, until very recently, regarded as a diagnostic sign of fracture of the base; and there can be no doubt that when such a discharge of cerebro-spinal fluid occurs either from the ear or nostrils, that it *most probably* is connected with fracture. Operative interference is very seldom required in these fractures, our treatment being directed not against the broken bones, but against the accompanying cerebral lesions.

SKUNK (*Mephitis*), a genus of quadrupeds of the weasel family (*Mustelidæ*), but departing very considerably from the typical characters of that family, and approaching to the badgers and gluttons in general appearance, in habits, in the lengthened



Common Skunk (*Mephitis varians*).

claws of the fore-feet, in the plantigrade hind-feet, and in some of the teeth. There are six incisors and two canine teeth in each jaw, eight molars in the upper, and ten in the lower; the teeth generally resemble those of the polecat. Skunks depend very much for defence against enemies on an excessively fetid fluid, which is secreted by glands near the anus; and when assailed, they turn the rump towards

the assailant, elevate the tail, and discharge this fluid with considerable force. The odour proceeding from it, even when a dead S. had been flung into an enclosure, has been known to cause nausea to the inmates of an apartment with closed windows at the distance of 100 yards. So confident does the S. seem of the efficacy of its peculiar mode of defence, that it permits itself to be approached till it is just on the point of being seized, which, however, is only attempted by the inexperienced, when the battery is discharged. It is almost impossible to remove the odour from clothes. Dogs flee at once, and rub their noses on the ground till they bleed. Dogs that are aware of the S.'s powers, however, kill it by leaping upon it suddenly, and in such a way that they are not exposed to danger. There is much uncertainty concerning the species of S., as the colours vary considerably even in the same species; but there is no doubt of the existence of a number of species. They are found only in America, where they are very widely distributed from Hudson's Bay to the Strait of Magellan. The COMMON S. (*M. Americana* or *varians*) is about the size of a cat, generally black or blackish brown, with white streaks along the back. It inhabits burrows which it makes in the earth, feeds on mice, frogs, &c., and also on insects and fruits; and sometimes enters houses to plunder storerooms, where, if it is suddenly alarmed, everything is tainted with an intolerable odour. White streaks on the back, one or more, are very characteristic of this genus.

SKYE (Icelandic, *Sky*, a cloud), the largest of the Scottish islands after Lewis, and the most northerly of the group known as the Inner Hebrides, forms part of the county of Inverness, from the mainland of which it is separated by a channel scarcely half a mile in breadth at its narrowest point, Kyle Rhea. Its extreme length, from south-east to north-west, is 47 miles; breadth, from 7 to 25 miles; but on account of the extraordinary number of inlets at all parts of the island, no point is above 4 miles from the sea. Area, 547 sq. m.; pop. (1861) 18,751. S. is for the most part mountainous and moory, but it contains some pleasant tracts of arable and pasture land, and one considerable plain, formerly the bed of a lake, in the parish of Kilmuir. The principal mountains are the Coolin Hills, which stretch irregularly chiefly from south-west to north-east, culminating in the sharp peak of Scoor-nan-Gillean (3220 feet) above Sligachan. The singularly jagged outline of these remarkable hills arrests the eye at a great distance, and forms the dominant feature in the view at almost every point round the island, and far out at sea. The most famous scene in this region is Loch Coiruisg, a small fresh-water lake near the head of the bay of Scavaig, all but encircled by frowning ridges of rock, shooting up at some points to the height of 3000 feet. It has been powerfully depicted by Sir W. Scott in *The Lord of the Isles.* Glen Sligachan, extending from the head of the loch of that name about 9 miles to Caumsunary, is by many considered the grandest glen in the Highlands. The scenery of Cuiraing, near the north of the island, has been truly styled 'unique.' The coast-scenery of S. is for the most part highly picturesque, and in many places very grand. Between Rhu-nam-Brarin and Loch Staffin, the coast-line presents magnificent basaltic formations, on a scale of magnitude considerably exceeding the Giants' Causeway or Staffa. Over these cliffs descend many remarkable waterfalls, and their bases are frequently worn into deep caves, some of which are of historical interest. One, near Portree, afforded a refuge to Prince Charles; another, on the west coast, was the temporary prison of Lady Grange. The largest arms of the sea are Loch Bracadale, Loch Dunvegan, and Loch Snizort; and the chief harbours are those of Portree, Uig, Grishernish, Lochbay, Dunvegan, Poltiel, and Harport.

The coasts abound in fish, the most important being herring, cod, ling, and saithe. Good oysters are found in several places. The herring-fishery is prosecuted in the season in all the bays; the cod and ling fishery is chiefly confined to Loch Dunvegan and Loch Snizort; and the salmon-fishery to Portree and the east coast. Lobster-fishing is also carried on to a considerable extent. There are no rivers of any magnitude; but salmon and sea-trout are got in some of the principal streams, at Skeabost, Portree, Ose, Hammer, &c. The fresh-water lakes are also small, and few in number. Deer are not numerous, nor are grouse. An excellent breed of hardy ponies used to be extensively reared, but the cultivation of sheep now engrosses almost exclusive attention from farmers. The climate of S. is exceedingly moist, the days throughout the year during which no rain falls being generally few in number. A register kept at Portree shews the rainfall in the years 1860—1865 to have been respectively 87·99, 139·04, 111·19, 148·89, and 89·54 inches. The climate is, however, mild and healthy, and the average standard of longevity uncommonly high. Agriculture in S. is comparatively unprofitable, owing to the moisture of the climate, and is, in fact, falling into entire neglect on some of the chief sheep-farms. The soil, however, is in many places excellent, and capable, in dry seasons, of yielding good cereal crops, while for turnips it is peculiarly suited.

The inhabitants are for the most part poor. In the districts where the men practise fishing, nearly the whole of the adult males go to the Caithness fisheries in summer, while from all parts of the island young men and women go in troops to the south in search of field-labour. Potatoes and fish are the general diet, meat being a rare luxury. The population is chiefly Celtic, with, however, a considerable mixture of the Norse element. Gaelic is still universally spoken, but is gradually giving place to English. The chief proprietors are still, as of old, Lord Macdonald, whose seat, Armadale Castle in Sleat, is one of the most beautiful in all its surroundings to be seen on the Scottish coasts, and Macleod of Macleod, whose ancient castle of Dunvegan, picturesquely seated on a rock, has been pleasantly commemorated by Dr Johnson and Sir Walter Scott. Around these residences are the principal plantations to be seen in Skye. The principal port of S. is Portree, a picturesquely situated village of about 600 inhabitants, to which steamers regularly ply from Glasgow. Other villages, also calling-points of the steamers, are Kyleakin (Hakon's Strait), Broadford, and Dunvegan. The principal exports are cattle and sheep, wool, fish, shell-fish, and eggs. At Portree, there is a flourishing tweed manufactory, the only one in the island. The celebrated distillery of Carabost (or Talisker) is now given up. The inhabitants are, with the exception of a few families, all Presbyterians, and, as in the rest of the Highlands, chiefly adherents of the Free Church. Of the smaller islands near S., the chief are Raasay (q. v.), Ronay, Scalpay, Pabbay, Soay, all of which are inhabited.

SKY'RO (anc. *Scyros*), an island of the Grecian Archipelago, the largest member of the northern Sporades, 25 miles north-east of Cape Koumi, Eubœa. Its length is 19 miles; area estimated at about 60 sq. miles. S. is very mountainous and uncultivated in the south; but the northern part, though also hilly, has several fertile plains, which

produce as fine wheat as any grown in the archipelago. The only town in the island is Skyro, or St George, which is built on a high peak on the eastern coast, the broad summit of which is occupied by the ruins of a castle, and was the site of 'the lofty Scyros' of Homer. There are several relics of antiquity in the island. Pop. 2620.

SLAGS, called otherwise Scoriæ or Cinders, are fused compounds of silica in combination with lime, alumina, or other bases; and result as secondary products from the reduction of metallic ores. More or less of the metal always remains in a slag; in the early days of iron-smelting, the proportion of metal thus wasted was so great, that some old slags have been profitably smelted in recent times. Slags being silicates, are of the nature of glass, and externally have a glassy, crystallised, or stone-like character. Beautifully crystallised specimens are occasionally to be met with at smelting-works. They vary very much in colour, and are sometimes so prettily veined and marbled, that attempts have been made to apply them to ornamental purposes. Millions of tons of slag are annually produced at the iron-smelting works of Great Britain, but almost the only use to which it has yet been successfully applied is in the making of square blocks or bricks for building purposes. The slag is run into moulds, either as it issues from the blast-furnace, or after being remelted; and it is found to be a very durable material. Broken slag is also used as a covering for roads, but its brittleness and sharpness are objectionable qualities for this purpose. Several patents, beginning so far back as 1728, have been taken out for casting slag into articles of a more ornamental kind, but hitherto they have not been commercially successful.

In an archæological point of view, slags are interesting as pointing out the sites of ancient smelting-works, and as affording a clue to the primitive methods of obtaining the metals from their ores.

SLANDER is an injury to a person's character and reputation caused by spoken words. It is difficult to define what kind of injuries of this nature are actionable, but in general whatever imputes disgraceful, fraudulent, or dishonest conduct, or even tends to make a man contemptible in his private relations, and shunned by his friends and neighbours, is a slander. Thus, whatever imputes a crime or indictable offence, or a contagious disease, is a slander. There are some epithets, however, which are not actionable unless some special damage is directly caused thereby, as calling a man a scoundrel, swindler, rogue, gambler, liar, &c. To call a woman a whore is also not actionable, unless she can shew that she has lost offers of marriage, &c. thereby. Words imputing gross ignorance or misconduct affecting one's trade or profession, are, however, actionable, as calling a man a bankrupt grocer, a quack doctor, &c. See also LIBEL. The remedy for slander is an action at law for damages. Though certain words when spoken will not amount to slander, yet, if printed or written, they will sometimes become so, as calling one a rogue, swindler, rascal, &c.

SLANG, a word originally borrowed from the gipsy tongue, where it is used for the secret language of that tribe. In its usual signification, it denotes a burlesque style of conversational language, originally found only among the vulgar, but now more or less in use in this country among persons in a variety of walks in life. It is somewhat allied to, though not identical with *cant* (in French *argot*), the language used for purposes of concealment by thieves and vagrants of all descriptions.

Slang is not exclusively of modern date. It was known in the classic ages of Greece and Rome, and abounds in the writings of Aristophanes, Plautus, Terence, and Martial. Every modern European language has its slang. In our country, the 'Rump,' the 'Barebones Parliament,' the terms 'Roundheads,' 'Puritans,' 'Quakers,' all belonged to the slang of the 17th century. *Hudibras* and the dramatic works of last century abound in slang. Old English slang was coarser than that now in use, but the greater portion of its phraseology had a somewhat restricted circulation, not permeating every species of conversation to the extent that modern slang does. Towards the close of last century, the slang vocabulary received large additions from pugilism, racing, and 'fast life;' and its fashionable vulgarisms came into great favour during the minority of the Prince Regent. In the present century, the growth of refinement in manners and ideas has not banished slang, but given it a more familiar and utilitarian character, while it has been introduced in some measure into circles where it was formerly unknown.

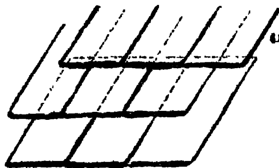
Slang consists in part of new words, and in part of words of the legitimate language invested with new meanings, such as are assigned to the verbs to *cut*, to *do*. Many slang expressions are derived from thieves' cant, and some from the gipsy tongue. Their derivations are often indirect, arising out of fanciful allusions and metaphors, which soon pass out of the public mind, the word remaining, while its origin is forgotten. The origin of much of the current slang may be traced to the universities of Oxford and Cambridge, and the great public schools of England. There is not an institution connected with the university which has not its slang equivalent (e. g., 'plucked,' 'little go').

There is a slang attached to various professions, occupations, and classes of society. The slang of English fashionable life and fashionable novels comprises a number of French words and phrases, whose application is often very different from what is current in France. The *beau monde*, a *chaperon*, a marriage being on the *tapis*, are expressions which, in their English sense, are utterly unknown in Paris. To the slang of military life, Hindustani has contributed its quota of words, imported by officers who have resided long in India. We have also parliamentary slang, religious slang, literary slang, civic slang, and shopkeepers' slang.—Many curious details regarding slang in all its departments are to be found in Hotten's *Slang Dictionary* (Lond. 1865).

SLATE, or **CLAY-SLATE** (Fr. *esclat*, a shiver or splinter), is a highly metamorphosed argillaceous rock, fine-grained and fissile, and of a dull blue, gray, green, or black colour. It splits into thin laminæ or plates, that are altogether independent of the layers of deposit; though sometimes coinciding with them, they more frequently cross them at different angles. See CLEAVAGE. Some rocks that split into the thin plates of the original stratification, are popularly but erroneously named slate, as the thin bedded sandstones properly called flagstones or tilestones, the fissile shales of Cambrian and Silurian age, and the metamorphic, gneiss, and mica schist, whose planes of division correspond to their stratification. True slate is a very compact rock, little liable to be acted upon by atmospheric agencies. It is chiefly obtained from Palæozoic strata, but it is found also among more recent rocks. It is used for various purposes, being split into thin slabs of small size for the roofing of houses, and into larger slabs for fitting up dairies, &c., and even for making billiard-tables, and split and polished by means of pumice for writing-slates. There are extensive quarries of

roofing-slate in Wales and in the Western Highlands of Scotland, and in the Ardennes in France, some of which have been wrought for a long time, and give employment to a great number of workmen. A hard compact slate is best for roofing; that which is porous imbibes water, the freezing of which splits it in winter, whilst it affords also a soil for mosses, which soon injure the roof.

In roofing with slates, it is necessary to put on the slates in two thicknesses, so that the sloping joints may be covered by the overlap of the course above. Besides this, the third course must also cover the first by an inch or two, to prevent rain from penetrating. Slates are generally laid upon boarding, and bedded in lime, and nailed with malleable-iron nails, japanned, so as to prevent them from rusting. When large strong slates are used, they may be nailed to strong laths in place of boarding. Welsh slates are the cheapest and most generally used; but Easdale or Ballachulish slates, from the west of Scotland, are stronger and better when the roofs are liable to be injured.



SLATE-PENCILS are either cut or turned sticks of slate, or they are made by pressing moistened slate-powder until it is firm enough to be made into pencils.

SLAVE-COAST, a division of the coast of Upper Guinea, Africa, lying between the rivers Volta and Lagos. See GUINEA.

SLAVERY. A slave is an individual who is the property, or at the disposal of another, who has a right to employ or treat him as he pleases. Such is the state of the slave in the most absolute sense of the term; but slavery has been subjected to innumerable limitations and modifications.

Slavery probably arose at an early period of the world's history out of the accident of capture in war. Savages, in place of massacring their captives, found it more profitable to keep them in servitude. All the ancient oriental nations of whom we have any records, including the Jews, had their slaves. The Hebrews were authorised by their law to possess slaves, not only of other races, but of their own nation. The latter were generally insolvent debtors, who had sold themselves through poverty, or thieves who lacked the means of making restitution; and the law dealt with them far more leniently than with stranger slaves. They might be redeemed; and if not redeemed, became free in the space of seven years from the beginning of their servitude; besides which, there was, every fiftieth year, a general emancipation of native slaves.

Slavery existed in ancient Greece: in the Homeric poems, it is the ordinary destiny of prisoners of war; and the practice of kidnapping slaves is also recognised—Ulysses himself narrowly escaping a fate of this kind. None of the Greek philosophers considered the condition of slavery objectionable on the score of morals. Aristotle defends its justice on the ground of a diversity of race, dividing mankind into the free and the slaves by nature; while Plato only desires that no Greeks should be made slaves. One class of Greek slaves were the descendants of an earlier and conquered race of inhabitants, who cultivated the land which their masters had appropriated, paid rent for it, and attended their masters in war. Such were the Helots in Sparta, the Penestæ in Thessaly, the Bithynians at Byzantium, &c., who were more favourably dealt with than other slaves, their condition somewhat resembling that of the serfs of the middle ages. They could not be sold out of the country, or separated from their families, and were even capable of acquiring property. Domestic slaves obtained by purchase were the unrestricted property of their owners, who could dispose of them at pleasure. In Athens, Corinth, and the other commercial states, they were very numerous, and mostly barbarians. They were employed partly in domestic service, but more as bakers, cooks, tailors, or in other trades, and in mines and manufactories; and their labour was the means by which the owner obtained profit for his outlay in their purchase. These slaves were, for the most part, purchased; but few were born in their master's family, partly from the general discouragement of the cohabitation of slaves, and partly from the small number of the female in comparison with the male slaves. An extensive traffic in slaves was carried on by the Greek colonists in Asia Minor with the interior of Asia; and another source of supply arose from the practice common among Thracian parents of selling their children. In Greece in general, and especially at Athens, slaves were mildly treated, and enjoyed a large share of legal protection. According to Demosthenes, a slave at Athens was better off than a free citizen in many other countries.

The Roman condition of slavery differed in some particulars from that of Greece. All men were considered by the Roman jurists to be free by natural law; while slavery was regarded as a state contrary to natural law, but agreeable to the law of nations, when a captive was preserved, instead of being slain (hence the name *servus*, quasi *servatus*); or agreeable to the civil law, when a free man sold himself. In earlier times, there was no restriction on the master's power of punishing or putting to death his slave; and even at a later period, when the law on this head was much modified, slaves were used with considerable rigour. The estimation in which their lives were held is illustrated by the practice of gladiatorial combats, as also by the conduct of Vedius Pollio, who, in the polite age of Augustus, flung such slaves as displeased him into his fishponds, to feed his lampreys, and on the matter being brought under the emperor's notice, was visited with no severer punishment than the destruction of his ponds. Old and useless slaves were often exposed to starve in an island of the Tiber. Under the Empire, the cruelty of masters was in some degree restrained by law. It was enacted, that a man who put to death his own slave without cause should be dealt with as if the slave had been the property of another; and that if the cruelty of the master was intolerable, he might be compelled to sell the slave. A constitution of Claudius declared the killing of a slave to be murder, and it was also enacted, that in sales of slaves, parents and children, brothers and sisters, should not be separated. A slave could not contract marriage, and no legal relation between him and his children was recognised. The children of a female slave followed the status of their mother. There were various ways in which a slave might be manumitted, but the power of manumission was restricted by law. The harbouring of a runaway slave was illegal. The number of slaves in Rome, originally small, was increased much by war and commerce; and the cultivation of the soil came, in the course of time, to be entirely given up to them. During the later republic and empire, persons in good circumstances kept an immense number of slaves as personal attendants; and the possession of a numerous retinue of domestic slaves was matter of ostentation—200 being no uncommon number for

one person. A multitude of slaves were also occupied in the mechanical arts and the games of the amphitheatre. Originally, a slave was incapable of acquiring property, all his acquisitions belonging to his master; but when slaves came to be employed in trade, this condition was mitigated, and it became the practice to allow a slave to consider part of his gains, called his *peculium*, as his own, a stipulation being sometimes made that he should purchase his freedom with his peculium, when it amounted to a specific sum.

Though the introduction of Christianity did not do away with slavery, it tended to ameliorate the condition of the slave. Justinian did much to promote the eventual extinction of slavery; and the church excommunicated slave-owners who put their slaves to death without warrant from the judge. But the number of slaves again increased; multitudes being brought with them by the barbarian invaders, who were mostly Slavonian captives (whence our word *slave*); and in the countries which had been provinces of the empire, slavery continued long after the empire had fallen to pieces, and eventually merged into the mitigated condition known as serfdom, which prevailed all over Europe in the middle ages, and has been gradually abolished in modern times. See SERF. But though the practice of selling captives taken in war as slaves ceased in the Christian countries of Europe, a large traffic in slaves continued among Mohammedan nations, by whom Christian captives were sold in Asia and Africa; and in the early middle ages, the Venetian merchants traded largely in slaves, whom they purchased on the coast of Slavonia, to supply the slave-markets of the Saracens.

The negro slavery of modern times was a sequel to the discovery of America. Prior, however, to that event, the negroes, like other savage races, enslaved those captives in war whom they did not put to death, and a considerable trade in slaves from the coast of Guinea was carried on by the Arabs. The deportation of the Africans to the plantations and mines of the New World doubtless raised the value of the captive negro, and made slavery rather than death his common fate; while it may also have tempted the petty princes to make war on each other, for the purpose of acquiring captives and selling them. The aborigines of America having proved too weak for the work required of them, the Portuguese, who possessed a large part of the African coast, began the importation of negroes, in which they were followed by the other colonisers of the New World. The first part of the New World in which negroes were extensively used was Hayti, in St Domingo. The aboriginal population had at first been employed in the mines; but this sort of labour was found so fatal to their constitutions that Las Casas, bishop of Chiapa, the celebrated protector of the Indians, interceded with Charles for the substitution of African slaves as a stronger race; the emperor accordingly, in 1517, authorised a large importation of negroes from the establishments of the Portuguese on the coast of Guinea. Sir John Hawkins was the first Englishman who engaged in the traffic, in which his countrymen soon largely participated, England having exported no fewer than 300,000 slaves from Africa between the years 1680 and 1700; and between 1700 and 1786, imported 610,000 into Jamaica alone. The slave-trade was attended with extreme inhumanity; the ships which transported the negroes from Africa to America were overcrowded to such an extent that a large proportion died in the passage; and the treatment of the slave after his arrival in the New World depended much on the character of his master. Legal restraints were, however, imposed in the various European settlements, to protect the slaves from injury; in the British colonies, courts were instituted to hear their complaints; their condition was to a certain extent ameliorated, and the flogging of women was prohibited. But while slavery was thus legalised in the British colonies, it was at the same time the law of England (as decided in 1772 in the case of the negro Somerset), that as soon as a slave set his foot on English soil he became free; though, if he returned to his master's country, he could be reclaimed.

Before the idea of emancipation was contemplated, the efforts of the more humane portion of the public were directed towards the abolition of the traffic in slaves. In 1787, a society for the suppression of the slave-trade was formed in London, numbering Messrs W. Dellwyn, Thomas Clarkson, and Granville Sharp among its original members. The most active parliamentary leader in the cause was Mr William Wilberforce, whose views were seconded by Mr Pitt. In February 1788, an order of the crown directed that an inquiry should be made by a committee of the Privy Council into the state of the slave-trade; and an act was passed to regulate the burden of slave-ships, and otherwise diminish the horrors of the middle-passage. A bill introduced by Mr Wilberforce for putting an end to the further importation of slaves was lost in 1791. Meanwhile, our conquest of the Dutch colonies having led to a great increase in the British slave-trade, an order in council, in 1805, prohibited that traffic in the conquered colonies; and in the following year, an act was passed forbidding British subjects to take part in it, either for the supply of the conquered colonies or of foreign possessions. In the same year, a resolution moved by Mr Fox for a total abolition next session, was carried in the Commons, and on Lord Granville's motion, adopted in the Lords; and the following year, the general abolition bill, making all slave-trade illegal after 1st January 1808, was introduced by Lord Howick (afterwards Earl Grey) in the House of Commons, was carried in both Houses, and received the royal assent on 25th March 1807. British subjects, however, continued to carry on the trade under cover of the Spanish and Portuguese flags; the slave-ships were more crowded than ever, from the necessity of avoiding capture, and the negroes were not unfrequently thrown overboard on a pursuit. The pecuniary penalties of the act were discovered to be inadequate to put down a traffic so lucrative as to cover all losses by capture. Mr Brougham therefore, in 1811, introduced a bill, which was carried unanimously, making the slave-trade felony, punishable with 14 years' transportation, or from three to five years' imprisonment with hard labour. An act of 1824 declared it piracy, and as such, a capital crime, if committed within the Admiralty jurisdiction; and the statute of 1837, mitigating the criminal code, left it punishable with transportation for life. Among the philanthropic projects due to the exertions of the Anti-slavery Society was the establishment of the colony of Sierra Leone, on the coast of Africa, which had been formed by the British government in 1787, in order to shew the possibility of obtaining colonial produce without slave-labour, and after the abolition of the slave-trade, became a settlement for the negroes captured by British cruisers.

The United States of America abolished the slave-trade immediately after Great Britain, and the same was in the course of time done by the South American republics of Venezuela, Chili, and Buenos Ayres, by Sweden, Denmark, Holland, and during the Hundred Days after Napoleon's return from Elba, by France. Great Britain, at the peace, exerted her influence to induce other foreign powers to adopt a

similar policy; and eventually nearly all the states of Europe have passed laws or entered into treaties prohibiting the traffic. The accession of Portugal and Spain to the principle of abolition was obtained by treaties of date 1815 and 1817; and by a convention concluded with Brazil in 1826, it was declared piratical for the subjects of that country to be engaged in the slave-trade after 1830. By the conventions with France of 1831 and 1833, to which nearly all the maritime powers of Europe have since acceded, a mutual right of search was stipulated within certain seas, for the purpose of suppressing this traffic. The provisions of these treaties were further extended in 1841 by the Quintuple Treaty between the five great European powers, subsequently ratified by all of them except France. The Ashburton treaty of 1842 with the United States provided for the maintenance by each country of a squadron on the African coast; and in 1845, a joint co-operation of the naval forces of England and France was substituted for the mutual right of search.

All these efforts have not succeeded in altogether abolishing the slave-trade; and the encouragement which its continuance has given to the petty chieftains to enrich themselves at the expense of their fellow-countrymen, has tended to retard the progress of civilisation in Africa. The flag of Portugal, and occasionally of Spain, is believed to have been used with connivance of the authorities for carrying on the traffic, and no small difficulty has been found in obtaining the sincere co-operation of either of these two countries. In 1857, a scheme was sanctioned by the French government for conveying *free* negroes to the colonies of Guadaloupe and Martinico; but it gave rise to abuses, and the seizure of two vessels engaged in this enterprise as slavers by the Portuguese, with the disclosures which followed, led to its being given up.

The limitation of the supply of negroes naturally led, among other good results, to a greater attention on the part of the masters to the condition of their slaves. But the attention of British philanthropists was next directed towards doing away with slavery altogether in our colonies. Societies were formed with this end, an agitation was set on foot, and attempts were made, for some time without success, to press the subject of emancipation on the House of Commons. At length, in 1833, a ministerial proposition for emancipation was introduced by Mr Stanley, then Colonial Secretary, and an emancipation bill passed both Houses, and obtained the royal assent, 28th August 1833. This act, while it gave freedom to the slaves throughout all the British colonies, at the same time awarded an indemnification to the slave-owners of £20,000,000. Slavery was to cease on 1st August 1834; but the slaves were for a certain duration of time to be apprenticed labourers to their former owners. Objections being raised to the apprenticeship, its duration was shortened, and the complete enfranchisement took place in 1838. While this measure reflects the highest credit on the humanity which prompted it, it is not to be denied that emancipation has failed to benefit the slave or raise his condition to the extent hoped for by its more enthusiastic supporters.

The French emancipated their negroes in 1848; as did most of the new republics of South America at the time of the revolution; while the Dutch slaves had freedom conferred on them in 1863. In Hayti, slavery ceased as far back as 1791, its abolition having been one of the results of the negro insurrection of that year. Slavery still exists in the Spanish and Portuguese colonies.

Notwithstanding the statement in the 'Declaration of Independence,' that 'all men are born free and equal, and possess equal and inalienable rights to life, liberty, and the pursuit of happiness,' the colonies which threw off the British yoke numbered several hundred thousand negro slaves, whose condition of slavery was expressly recognised in the constitution of the United States, as ratified in 1788, provision being there made for the rendition of fugitive slaves, a subject the regulation of which was delegated to the federal government, slavery being otherwise left to be governed by the laws of the states where it existed. Slavery established itself firmly in the southern states, where negro labour was required for the cultivation of sugar and cotton; and after the limitation of the supply from Africa, the breeding of slaves went on to a large extent in Maryland and Virginia for the supply of the other states of the south. The different position of the northern and southern states regarding slavery, combined with other causes to engender that diversity of feeling and interest between north and south, out of which arose the late civil war. The politicians of the north, however, except a small section, by no means advocated the abolition of slavery where it already existed; they only objected to its extension to new states. The increased consumption of cotton led to an increased demand for slave-labour; and in 1820, when Missouri was admitted to the Union as a slave state, a compromise was entered into by which slavery was legalised to the south, but prohibited to the north of 36° 30′ N. lat. (see MASON AND DIXON'S LINE). California, though partly lying south of that geographical line, was admitted as a free state, the southern party obtaining in compensation the boon of an amendment of the Fugitive Slave Law, making it penal to harbour runaway slaves or aid in their escape. A reaction against the policy of the south, and Mr Lincoln's election as President, were the signals for a long contemplated secession of the southern states, and the bloody war which ended in the overthrow of the principle of state-sovereignty and the consolidation of the Union. In the course of the war, many negroes were emancipated; and on 22d September 1862, Mr Lincoln issued a proclamation declaring all the negroes of secession masters who should not have returned to the Union before 1st January 1863, to be free. Since then the legislatures of the different states have formally accepted the amendment of the constitution, and passed an act for the abolition of slavery.

SLAVES, or SLAVONIANS (native name *Slowene* or *Slowane*, derived by some from *Slawa*, fame, but better from *Slowo*, a word; thus meaning 'speaking' or 'articulate,' as distinguished from other nations, whom they called Niemetz, or 'Mutes'), the general name of a group of nations belonging to the Aryan family, whose settlements extend from the Elbe to Kamtchatka, and from the Frozen Sea to Ragusa on the Adriatic, the whole of Eastern Europe being almost exclusively occupied by them. They were settled in these regions before the dawn of history, and are comprehended by ancient writers under the designations of Sarmatians and Scythians. The original names of the Slavic tribes seem to have been Winds or Wends (*Venedi*) and Serbs. The former of these names occurs among the Roman writers, and later, in Jornandes, in connection with the commercial peoples of the Baltic Sea; the latter is spoken of by Procopius as the ancient name common to the whole Slavic stock. The earliest historical notices extant represent the S. as having their chief settlements about the Carpathians, from which they spread northward to the Baltic, westward as far as the Elbe and the Saal, and later, after the overthrow of the kingdom of the Huns,

southward beyond the Danube, and over the whole peninsula between the Adriatic and the Black Sea. These migrations ceased in the 7th c.; the division of the Slavic stock into separate branches became now more complete, and gradually they began to form into independent states. The various sections of the stock may be divided into two groups, the south-eastern and the western; the first comprehends—(1), Russians; (2), Bulgarians; (3), Illyrians (Serbs, Croats, Winds): the second—(1), Lechs (Poles, Silesians, Pomeranians); (2), Czechs or Bohemians (Czechs, Moravians, Slovaks); (3), Polabians, comprising the Slavic tribes of N. Germany, who are fast disappearing, by being absorbed in the Teutonic population. With the exception of Russia (to which may be added Servia and Montenegro, as maintaining a kind of independence), the once numerous Slavic kingdoms (Bohemia, Bulgaria, Moravia, Poland, &c.) have lost their sovereignty, and been incorporated in other states, chiefly Turkey, Austria, Prussia, and Saxony. The Polabians never attained any distinct political footing. The whole of the Slavic populations are estimated at upwards of 80 millions.

The S. are represented by ancient writers as an industrious race, living by agriculture and the rearing of flocks and herds; as hospitable and peaceful, and making war only in defence. The feeling of nationality was strong among them. The government had a patriarchal basis, and chiefs or princes were chosen by assemblies. But contact with the feudal institutions of the Roman-German empire gradually altered this primitive constitution; the Slavic princes strove after unlimited power, like that of the emperors; and the chiefs sought to dominate over the people, like the feudal nobility. In the course of the 11th, 12th, and 13th centuries, nobility became a hereditary privilege throughout the Slavic states. The worst kind of feudalism fairly took root, and the people sank into the condition of serfs. Between them and the nobles there was no third or middle class, as the peculiar privileges of the nobility prevented the growth of cities. See SERF, RUSSIA.

The *religion* of the ancient S., like that of the Teutonic nations, seems to have been, in many of its features at least, a kind of nature-worship; not, however, without the idea of a One supreme power, to whom the other agencies were subordinate. From this, some authorities infer that the system was originally a monotheism, which in process of time had become obscured and confused by the infusion of foreign elements, and thus degenerated into polytheism, and finally pantheism. The chief deity, whose worship seems to have been common to all the Slavic tribes, was Swiatowit, with whom were associated, on a nearer footing of equality than the other gods, Perun and Radegast—if, indeed, these three names do not merely denote different personations or manifestations of the same power. In this trinity, Swiatowit is considered as most analogous to Mars and Zeus, Perun to Jupiter and Thor, and Radegast to Mercury and Odin. Of the numerous gods of an inferior order, we may name Prowe, god of justice; Prija (= Freya), Venus; Bjelbog, the White god, and Cernobog, the Black god; together with multitudes of demons and spirits good and bad. The images of the Slavic divinities (a stone statue of Swiatowit was in recent times discovered in Eastern Galicia) had a striking resemblance to those of India. Swiatowit had four heads, Rugewit (the god of war) had seven faces, and Perun four, and so on. The S. seem to have been not without some crude notion of existence and retribution after death. Worship was performed in groves and temples, cattle and fruits being offered by the priests, whose office must have been originally performed by the head of the family or chieftain, as the common name for priest and prince (*kniez*) shews. —The eastern S. received Christianity from Byzantium in the 9th c., through the instrumentality of Cyril (q. v.) and Methodeus; the western, from Rome and Germany.—See Schafarik, *Slaw. Alterthümer* (Ger. translation, Leip. 1843).

SLA'VIC LANGUAGE AND LITERATURE. The term Slavic, as applied to language or race, is a generic name (like Celtic or Teutonic) for a group of kindred languages and peoples belonging to the great Indo-Germanic or Aryan family. In its roots and structure, the Slavic language exhibits a remarkable similarity to Sanscrit, but has become European, so to speak, in the course of a long literary development, begun *before* that of any of the other European families. Its peculiarities are quite marked. The leading characteristics of the Slavic tongues are the completeness of their system of declensions, the want of articles, the absence of pronouns in the conjugation of the verb, pure vowel-endings, the fixed quantity of the syllables, the free construction of sentences, and the richness of their vocabulary. The earliest dialect of Slavic that received a literary culture was the 'Old Bulgarian,' better known as the 'Church Slavic,' which, however, failed to become the literary vehicle for all the Slavic peoples, inasmuch as the special dialect of each gradually acquired a literature of its own. Altogether, writers reckon eight distinct extant dialects of Slavic: 1. The 'New Bulgarian;' 2. The Russian; 3. The Servian or Illyrian; 4. The Polish; 5. The Bohemian; 6. The Slovak; 7. The Wendic; 8. The Polabic. Such of these as merit special treatment have received it. —See BOHEMIAN LANGUAGE AND LITERATURE, POLISH LANGUAGE AND LITERATURE, RUSSIAN LANGUAGE AND LITERATURE, SERVIAN LANGUAGE AND LITERATURE.—In regard to Slavic literature, considering the articles just mentioned, it is only necessary to state that at present the Russian branch of the Slavic is the richest in the number of its published works; but as regards literary merit, the Polish ranks first, having cultivated with great success almost all sorts of literature, and possessing in particular a very exquisite poetry. The Bohemian and Servian literatures both contain many fine and distinctively original productions, worthy of being more widely known than they are.—See Schafarik's *History of the Slavic Language and Literature* (Ofen, 1816); and Mickiewicz's *Lectures on the Slavic Literature* (4 vols. Leip. 1849).

SLAVO'NIA, a province of Austria, lying east of Croatia (q. v.), with which it is now politically united. It is bounded on the N. by the Drave, on the E. by the Danube, on the S. by the long strip of marsh-land known as the Slavonian Military Frontier, which stretches between it and the Save. Area of the kingdom of Croatia (q. v.) and Slavonia, 7074 sq. m.; pop. 967,200. The greater part of the surface consists partly of eminences clothed with vines and fruit-trees, and partly of fertile and swampy plains. The mountains are rich in coal, marble, and mineral springs. The principal products are all sorts of grain, particularly maize and wheat, leguminous plants, and fruit in abundance, apples, pears, plums, walnuts, chestnuts, melons, wine, &c. There is little manufacturing industry in Slavonia.—The inhabitants of S. belong to the Slavic family (see SLAVES), and call their land Slavonska; themselves Slavonaz. They speak the so-called Illyrian or Servian tongue. See SERVIAN LANGUAGE AND LITERATURE. The Slavonians proper are a handsome, tall, and

slender race. The prevailing form of religion is the Roman Catholic, but the non-united Greek Church also numbers many adherents. Education is still in a backward state. Capital of the country, Eszék (q. v.).

SLEEP. This term is employed to designate that state of suspension of the sensory and motor functions which appears to alternate in all animals with the active condition of those functions, and which may be made to give place to it by the agency of appropriate impressions upon the sensory nerves. This definition, which we have borrowed from Dr Carpenter's article on 'Sleep' in Todd's *Cyclopædia of Anatomy and Physiology*, may seem somewhat complex, but cannot be simplified without rendering it less stringent. The necessity for sleep arises from the fact, that the exercise of the animal functions is in itself destructive of the tissues of the organs which minister to them, so that if the waste produced by their action were not duly repaired, they would speedily become unfit for further use; and it is on the nutritive regeneration of the tissues which takes place during true healthy sleep that its refreshing power depends. While the sensory and motor functions are suspended during the condition we designate as sleep, the organic functions are uninterruptedly carried on, the respiratory, cardiac, and peristaltic movements proceeding with equal uniformity during the sleeping and waking states.

There can be no doubt that the state of sleep is one to which there is a periodical tendency, and that this disposition is so arranged as to correspond in its recurrence with the diurnal revolution of the earth. Although in man and most animals night is, from its darkness and silence, the natural period for repose, yet there are numerous exceptions to the rule. For example, amongst lepidopterous insects, butterflies are active during the day, hawk-moths during the twilight, and moths during the night. Amongst birds, the goatsucker, or night-jar, and the owls, are nocturnal, and, as a general rule, the same is the case with carnivorous animals. The causes of sleep may be divided into the direct and the predisposing. The direct cause of sleep is that feeling of exhaustion or fatigue which is usually experienced when the waking activity has continued during a considerable portion of the twenty-four hours—a feeling that the brain requires repose; and, in fact, unless the brain be in an abnormal condition, sleep will at last supervene, from the absolute inability of that organ to sustain any further demands upon its energy. Among the predisposing causes which favour the access of sleep, we must especially notice 'the *absence* of sensorial impressions; thus, darkness and silence usually promote repose; and the cessation of the sense of muscular effort which usually takes place when we assume a position that is sustained without it, is no less conducive to slumber.'—Carpenter's *Human Physiology*, 6th ed. 1864, p. 592. On the other hand, persons accustomed to live where there is a continuous noise, as in the neighbourhood of mills or forges, often cannot sleep if the noise is suspended. These cases, however, probably fall within the next general predisposing cause—namely, the *monotonous repetition* of sensorial impressions. Thus, the droning voice of an unimpressive reader or preacher, the gentle ripple of the ocean, the hum of bees, the rustling of foliage, and similar monotonous impressions on the auditory nerves, are usually provocative of sleep. In these and similar cases, the influence of the impressions is exerted in withdrawing the mind from the consciousness of its own operations, and in suspending the directing power of the will; and this is the case, says Dr Carpenter, 'even when the attention is, in the first instance, *voluntarily* directed to them, as in some of the plans which have been recommended for the induction of sleep, when there exists no spontaneous disposition to it. In other methods, the attention is fixed upon some internal train of thought, which, when once set going, may be carried on automatically, such as counting numbers, or repeating a Greek verb. In either case, when the sensorial consciousness has been once steadily fixed, the monotony of the impression (whether received from the organ of sense or from the cerebrum) tends to retain it there; so that the will abandons, as it were, all control over the operations of the mind, and allows it to yield itself up to the soporific influence. This last method is peculiarly effectual when the restlessness is dependent upon some mental agitation, provided that the will has power to withdraw the thoughts from the exciting subject, and to reduce them to the tranquillising state of a mere mechanical repetition.'

The access of sleep is sometimes quite sudden, the individual passing at once from a state of complete mental activity to one of entire torpor. More generally, however, it is gradual, the mind while remaining poised, as it were, between sleep and the opposite condition being 'pervaded by a strange confusion which almost amounts to wild delirium; the ideas dissolve their connection with it one by one; and its own essence becomes so vague and diluted that it melts away in the nothingness of slumber.'—Macnish, *Philosophy of Sleep*, p. 21. The amount of sleep required by man is affected by so many conditions (amongst which must be especially mentioned *age*, *temperament*, *habits*, and previous exhaustion), that no general rule can be laid down on the subject. The condition of the *fœtus* may be regarded as one of continuous slumber: on its first entrance into the world, the infant passes most of its time in sleep, and this is particularly the case in children prematurely born, such children seeming only to awake for the purpose of receiving food. During the whole period of growth, in which it is necessary that the *constructive* operations of the body should preponderate over the *destructive* processes, an excess of sleep is required; and by the time that adult age has been attained, and the constructive and destructive processes balance each other, the necessary amount of sleep has gradually fallen to about one-third or less of the diurnal cycle. In very old age, again, in consequence of the deficient energy of the nutritive process, a larger amount of sleep is required. With regard to the influence of temperature, it is observed that a plethoric habit of body usually predisposes to sleep, while thin wiry people of a nervous temperament require comparatively little sleep. Persons of lymphatic temperament are usually great sleepers, but this is probably due, as Dr Carpenter suggests, to the fact, that 'through the dulness of their perceptions they are less easily kept awake by sensorial or mental excitement' than persons of a happier temperament. The influence of habit is by no means inconsiderable on the amount of sleep required by individuals, and this influence may be brought to act on the protraction as well as the abbreviation of the usual period: as extreme examples, we may mention that General Eliott, celebrated for his defence of Gibraltar, did not sleep more than four hours out of the twenty-four (which is probably the smallest allowance for rest compatible with a life of vigorous exertion); while Dr Reid, the metaphysician, could take as much food, and afterwards as much sleep, as were sufficient for two days. Moreover, the influence of habit in producing an aptitude for repose, or a readiness to wake at particular periods, is well known.

The sleep of soldiers during a siege, of sailors or others who must take their rest as they best can, will often come on at command; nothing more being necessary to induce it than to assume a recumbent, or, at all events, an easy position, and to close the eyes. Thus, Captain Barclay, in his celebrated match, in which he walked 1000 miles in 1000 successive hours, very soon got into the habit of falling asleep the moment he lay down.

The condition of the great nervous centres during sleep is a subject of much interest, on which considerable light has recently been thrown by the observations of Mr Durham.* These observations were made on a dog from which a portion of bone about as large as a shilling was removed from the parietal region of the skull, and the subjacent dura mater cut away so as to expose the brain; and Mr Durham draws the following conclusions from them: 1. Pressure of distended veins upon the brain is not, as is generally believed, the cause of sleep, for during sleep the veins are *not* distended. 2. During sleep, the brain is in a comparatively bloodless condition; and the blood in the encephalic vessels is not only diminished in quantity, but moves with diminished rapidity; and this is corroborated by the observations of Dr J. Hughlings Jackson on the ophthalmoscopic condition of the retina during sleep, the optic disc being then whiter, the arteries smaller, and the retina generally more anæmic than in the waking state. 3. The condition of the cerebral circulation during sleep is, from physical causes, that which is most favourable to the nutrition of the brain-tissue.

This article would be imperfect without a brief reference to the conditions in which there is either an excess or a deficiency of sleep. There are numerous instances on record in which sleep has been continuously prolonged for weeks, or even months. Dr Carpenter refers to two such cases, namely, those of Samuel Chilton (*Phil. Trans.* 1694) and Mary Lyall (*Trans. Roy. Soc. Edin.* 1818). Blanchet, a French physician, has recently recorded three cases of what he terms 'constitutional lethargic slumber' in the *Comptes Rendus*, 1864. In one of these cases, the patient, a lady aged 24 years, who had slept for 40 days when she was 18 years of age, and 50 days when she was 20, at length had a sleep of nearly a year, viz., from Easter Sunday 1862 to March 1863. During this period, a false front tooth was removed in order to feed her with milk and soup, her only food. She was motionless and insensible. The pulse was low, the breathing scarcely perceptible, there were no evacuations, and she shewed no signs of leanness, her complexion remaining florid and healthy. In such cases as these, it is not a prolongation of healthy natural sleep that is present, but a condition of hysteric coma.

Again, there are certain states of the nervous system in which there is either an entire absence of sleep (and this may continue for many days, or even weeks) or incomplete sleeplessness. Complete sleeplessness is often a most important symptom of disease. It frequently accompanies certain forms of continued fever, inflammatory affections of the brain, the eruptive fevers, &c., and when it continues for many days and nights, delirium, followed by stupor, is very apt to supervene. When the wakefulness is unattended by any disorder sufficient to account for it, some serious disease of the brain is most probably impending, such as palsy, apoplexy, or insanity. Incomplete or partial sleeplessness is a symptom of far less grave import. It is of frequent occurrence in persons whose minds are much engaged, or whose occupations subject them to great mental exertion, or to the vicissitudes of fortune. It is, moreover, a symptom of many chronic diseases, as gout, chronic rheumatism, skin-diseases, disorders of the urinary organs, dyspepsia, hysterica, &c. It may also be excited by certain beverages and articles of diet; thus green tea and strong coffee often occasion wakefulness, and a full meal of animal food late in the day often disturbs the sleep of persons accustomed to dine at an earlier hour.

In the treatment of sleeplessness, or *insomnia*, as it is usually termed by medical writers, the first indication is to remove the cause which occasions it, and 'more particularly to correct a close or contaminated air; to reduce the temperature of the apartment when it is high, and the quantity and warmth of the bedclothes; to remove all the excitants to the senses; to abstract the mind from all exciting, harassing, or engaging thoughts; and to remove or counteract the morbid condition of which this is a symptom or prominent consequence.' —Copland's *Dictionary of Medicine*, art. 'Sleep and Sleeplessness.' A careful regulation of the secretions, by the due use of purgatives and alteratives, will often remove this symptom; and recourse should not be had to anodynes and narcotics until morbid secretions and fæcal accumulations have been completely got rid of. But these medicines are of great service when the system is thus prepared for their reception. The choice of the individual drug or combination of drugs must be dependent upon the peculiarities of the case, but, as a general rule, there is no more serviceable narcotic mixture for an adult than 25 or 30 minims of the solution of hydrochlorate of morphia (of the British Pharmacopœia), and 10 minims of chloric ether, taken in half a wine-glassful of water: medicines of this class should, however, never be resorted to without the advice of a physician.

* *The Physiology of Sleep*, in Guy's Hosp. Reports, Third Series, vol. 6, pp. 149—171.

SLEEP OF PLANTS, one of the phenomena of Irritability (q. v.) in plants. Light acts on plants as a powerful stimulus, essential to their active and healthful vegetation. When it is withdrawn, the flowers of many plants close, and the greater number shew a tendency to it, whilst leaves more or less decidedly incline to fold themselves up. The leaf-stalk also generally hangs down more or less, although in some plants it is more erect during sleep. The sleep of plants, however, is not always nocturnal. The flowers of some open and close at particular hours of the day. Thus, the crocus is a morning flower, and closes soon after mid-day; whilst some flowers expand only in the evening or during the night. Their hours of vegetative rest are probably as essential to the health of plants as those of sleep are to animals. It was Linnæus who first observed the sleep of plants in watching the progress of some plants of *lotus*, the seeds of which he had sown.

SLEEPERS, timbers laid *asleep* or resting along their whole length. They are chiefly used along the top of dwarf-walls for the support of the timbers of the ground floor of houses.—The timbers supporting railway rails, and laid at right angles to them across the railway, are also called sleepers.

SLE'SVIG, a duchy known till the 14th c. as South Jutland, formed part of the Danish dominions till 1864, when it fell into the hands of the Austrian and Prussian sovereigns, who have not yet (February 1866) settled its future destiny. The population in 1860 was 409,907. Within its old recognised limits, it was bounded on the N. by Jutland; on the E. by the Little Belt and the Baltic; on the W. by the German Ocean; and on the S. by Holstein, from which it was divided by the Eyder and the

Kiel Canal. The area was 3492 sq. miles. The country consists in its eastern and central parts of a gently undulating plain, deeply indented with fiords and streams; and on its western boundary of flat marshy tracts of ground, which require to be protected from the encroachments of the sea by numerous dams.

The numerous islands which skirt the west coast of S. have probably, at some not very remote period, formed part of the mainland, for navigation is so seriously impeded by the sandbanks, that this coast is now accessible for ships by only three passages. The cluster of small islands known as the Halligers, which lie, unprotected by dams, in the midst of these submerged sand-tracts, are so constantly exposed to the action of waves and storms, that the inhabitants are compelled to raise their houses on piles. On the eastern coast of S. lie the islands of Alsen, Aroe, and Femern, where the principal bays and inlets are the Haderslev and Aabenrade Fiords, opening into the Little Belt; the Flensborg Fiord, the Slie, the Eckernforde Fiord, and the Kieler Fiord, which formed the ancient boundary between S. and Holstein on the S.-E., while the Eyder completed it on the S.-W. The principal branches of industry are agriculture, the rearing of cattle, fishing, and ship-building. The Slie is the chief seat of the herring and salmon fisheries, which, although still of some importance, are very inferior to those of the middle ages, when, according to the Danish historian, Saxo Grammaticus, herrings were so plentiful in the Belts and Cattegat, that they could be caught with the bare hands. The chief towns of S. are Flensborg (q. v.), Slesvig, Haderslev (pop. 8000), Husum, and Tonder, neither of which has more than 5000 inhabitants. On the south frontier, and partly in Holstein, Rendsborg (pop. 11,000). S. has 800 country schools, diffused over every part of the duchy. With regard to the language spoken by the mixed population of the duchy, it may be asserted that rather more than the half speak Danish; and of the remainder, about 30,000 persons who belong to the islands on the western coast, which once formed part of the old province of North Friesland, still use the Frisic language, the rest of the inhabitants using either Low or High German. The original Danish element of S. has remained purest in the northern half of the duchy; while in the southern parts, where the inhabitants are naturally brought much in contact with Holstein, they have of late years adopted the views, tastes, and language of their German neighbours. The Lutheran is the established religion of Slesvig.

In accordance with the conditions stipulated in the treaty of Vienna, August 1864, by which the duchies of Holstein and S. were ceded to Austria and Prussia, the island of Aroe and other districts of S., measuring about 115 sq. m., were to be reunited to Denmark; while the latter power was to give in exchange a territory of about 130 sq. m., which, although situated within the boundary of S., had hitherto been under the jurisdiction of Jutland.

S., which forms part of the ancient Cimbrian Peninsula, has from the earliest period been a debatable land between Danes and Germans; and according to the authorities of the latter, it was anciently included in the Marches of the empire, having been incorporated by Henry the Fowler in 930, and reorganised by Otho I., when in 948 the latter erected bishops' sees in Aarhuus, Ribe, and Slesvig. In 1027, the Danish king Knud (our Canute) obtained from Conrad II. the recognition of the independence of S., which was declared to belong unconditionally to Denmark, and thenceforth given as a Danish fief of the crown to the younger sons of the regal house. In 1232, King Valdemar Seir, whose father, Prince Knud Laward, had ruled ably over the duchy, gave S.—which was then, and for some time later, known as South Jutland—to his younger son Abel. The exact terms of the donation became a subject of dispute during the successive reigns of Valdemar's sons, Eric, Abel, and Christopher, and began the long course of civil wars and family feuds which are associated with this much-contested territory. Abel, and his sons after him, backed by their kinsmen, the Counts of Holstein, maintained that Valdemar had given the duchy as an hereditary, inalienable, and indivisible fief; while, on the part of the Danish crown, it was contested that South Jutland was merely a *precarious* fief, which might be recalled at the pleasure of the sovereign. Its vicinity to Holstein tended to keep up the feuds, to which the vexed question of its mode of tenure had given occasion, and which, in fact, only ceased when the resources of the conflicting parties were exhausted, although the bitterness and ill-will with which they were fed seemed to know no intermission. The following brief summary gives the skeleton of the leading events of the history of S. from the dawn of its troubles till the final outbreak in 1848, when, by the influence of the neighbouring Holstein nobles, the Germanised great landed proprietors of S. entered upon the course of armed opposition to the mother-country, which has culminated at the present moment in the forcible separation from the Danish crown of the duchy of S., and its imminent incorporation in the Prussian monarchy. In 1386, Queen Margaret (q. v.) gave S. in fief to Gerhard, Duke of Holstein; and on the extinction of his male heirs in 1459, it virtually lapsed to the crown, with which it was united in 1460 under the rule of Christian I. (the founder of the Oldenburg line), by a mode disastrous to the integrity of the Danish monarchy. See DENMARK. After frequent division among the younger members of the royal House, which gave rise to a great number of collateral lines of the Oldenburg family (of which the Glucksburg-Sonderborg and the Augustenburg are, with the exception of the imperial House of Russia and the ducal House of Oldenburg, the chief representatives), the ducal portions of S. were inalienably incorporated with the crown of Denmark under King Frederick IV. in 1721. This act, which had the guarantee of the great powers, had resulted directly from the treasonable attitude maintained in the previous wars with Sweden by the Holstein-Gottorp princes of S., and was ratified by Russia and Sweden, no less than by England and France. The different orders of the duchy took the oaths of allegiance for themselves and their heirs, the S. arms were quartered with those of Denmark Proper, and the duchy was included with the latter in one common mode of administration. In 1848, the revolutionary movement of continental Europe fanned the flame of discontent in the duchies into a blaze, and the upper classes of S., who had in the course of time become strongly imbued with the German tendencies of the Holstein nobles, with whom they fraternised, joined the latter in open armed rebellion under the chief leadership of the princes of Augustenburg. The Germanised S. nobles, influenced by the principles of hatred to Denmark, which had long been gathering strength in the university of Kiel, refused to admit the difference between their relations to the crown and those of the Holsteiners, with whom they demanded to be indissolubly associated in separate legislative and executive chambers. The king refused to separate S. from the monarchy; the irritation increased on both sides; the royal troops appeared in the duchies to restore order;

the S.-Holstein army, whose ranks were principally filled by German volunteers, took the field, aided by the confederate forces sent by the Diet to co-operate with the Holsteiners. The troubles by which the German states were threatened at home led, after a few indecisive engagements had been fought, to the withdrawal of the confederate armies, and Prussia having made a special treaty of peace (after a preliminary truce with Denmark), the duchies were left to themselves, and the royal authority re-established, on the understanding that the king should submit a new form of constitution for Holstein and S. to the Diet, on account of the former being a member of the Confederation; S. being in the meanwhile put under a provisional government of Danish, Prussian, and English commissioners. By the peace with Prussia, it was solemnly guaranteed that all old treaties, including that of 1721, should be maintained in regard to Denmark; and in 1851, Austria threw an army into the duchies to aid Denmark in supporting her authority, and in dissolving the joint S. and Holstein assembly. On the death of Frederick VII. in 1863, Prince Christian of Glucksburg (see DENMARK), having ascended the throne as Christian IX., king of Denmark, Prince Frederick of Augustenburg called upon the S.-Holstein authorities to refuse the oath of allegiance to the new king, and to acknowledge himself as the rightful duke of S.-Holstein, basing his claims on his descent from the legitimate and elder male line of the House of Oldenburg. This appeal was responded to by 25 members of the Holstein Diet, who, on behalf of their own duchy and of S., petitioned the German Diet to recognise the validity of the claims of the Augustenburg line, and to pronounce the London protocol of the act of succession devoid of force. The Prince, by this step, set at nought the family compact by which his father, uncle, and himself, for themselves and their heirs, had, at the close of the war of 1848, accepted a sum of money as full indemnity for all claims on the Danish territories, and been allowed on that condition to evade all further consequences of the open rebellion in which they had stood against the throne. In the meanwhile, the fundamental law of November 1863 for the kingdom of Denmark and the duchy of S., which had passed the Rigsrad, and received the late king's signature shortly before his death, was published, together with a manifesto of Christian IX., stating his intention in regard to Holstein and Lauenburg. The Diet, without committing itself to uphold the Augustenburg claims, put a confederate execution into Holstein; the Danish troops were withdrawn into S.; and on the 6th January 1864, the Holstein towns did homage to the duke; while a Federal commission suppressed the provisional Holstein government, which had exercised its powers since 1862, and established a ducal government at Kiel. The Austrians and Prussians, professing to act for the Diet, summoned the Danish king to withdraw the constitution of November within 48 hours; in reply to which the Danish government demanded a term of six weeks to convoke the Rigsrad, without whose sanction no constitutional change could be adopted. The demand was rejected, and the Austro-Prussian army entered Holstein, and hostilities commenced. For ten weeks the Danes made a gallant stand against their enemy, whose enormous superiority in strength of numbers, and in the efficiency of their artillery and small-arms, made their final victory the inevitable rather than the glorious result of the campaign. The Danes were compelled to suspend hostilities, and to submit to the terms dictated by their conquerors. A conference was held at Vienna, and after protracted negotiations, Denmark was constrained to accept peace (August 1864), on the hard terms of ceding to Austria and Prussia, Holstein, S., and Lauenburg, on the ground that the indivisibility of the two duchies must be firmly established for the German fatherland by these two great powers. Since that time, Duke Frederick of Augustenburg has been in turn the favoured and the rejected candidate for the throne of the new state of S.-Holstein. The upper classes in small numbers in S., in Holstein almost unanimously, are in favour of his claims, while the burgher and lower classes of S. appear equally unanimous in regretting their severance from Denmark; and the decidedly expressed wishes of the Holstein party, backed by the lesser German states, to have the duke as their sovereign, the protests and counter-protests of the Diet and of foreign powers, have all resulted in an announcement by Austria and Prussia, that according to the evidence of the commission appointed to examine the merits of the various claims of Denmark, Augustenburg, and Oldenburg to the duchies, Christian IX. was by right of succession the undoubted possessor, and that from him the duchies had passed by right of victory to Austria and Prussia. This extraordinary solution of the S.-Holstein question was ratified at Gastein (August 1865), in a treaty between Austria and Prussia, in which, without regard to the German or Danish proclivities of Holstein or of S., the former duchy is transferred to Austria, and the latter to Prussia, and the garrisons and forts are to be manned at the pleasure of the contracting powers, who are agreed that both duchies shall join the Zollverein (q. v.); while Austria makes over to Prussia the rights acquired by the war over the duchy of Lauenburg for the sum of two and a half million Danish dollars.

SLICKENSIDES are the smooth and polished, and generally glazed surfaces of flaws in rocks. They are considered to have been produced by the friction of the two surfaces during some movement of the rock. But the two surfaces of the flaw are almost always so uneven that it is impossible to conceive that they could have rubbed against each other; besides, the flaws are generally very small, and the true slickenside is always confined to a single stratum, never passing into the bed above or below. We believe they are the castings of liquids or gases confined in the bed, and subjected to great pressure, and are similar in origin to the glazed cavities produced by gases in slags, or, to use a very familiar illustration, by the compressed steam in breakfast rolls.

SLIDING RULE, an instrument invented by the Rev. William Oughtred, an English divine and mathematician, for the purpose of solving arithmetical problems mechanically, consists of three pieces of wood, of which two are fastened together by slips of brass at a sufficient distance from each other to permit of a third sliding between them. The size of instrument which best combines convenience with accuracy is one about 2 feet long, 2 inches broad, and ¼ inch thick. One side of the rule has the following scales marked on it in order: a line of tenths of inches, of equal parts divided into tenths and hundredths of feet; three lines of numbers, each line consisting of the numbers from 1 to 10 twice repeated; a line of sine rhumbs (logarithmic sines of each quarter-point of the compass); a line of meridional parts; and a line of equal parts. Of these, two of the lines of numbers are on the middle piece or *slider*. On the other side are—two lines of *natural scales*, including sines, secants, tangents, equal parts, &c.; two lines of logarithmic sines,

two lines of logarithmic tangents, a third line of logarithmic sines, and a line of versed sines. Of these, one line of logarithmic sines and one of tangents are upon the slider. The scale in most common use is that of numbers, and a description of the way in which it is used will give a key to the whole working of the instrument. It is necessary, however, to notice as a preliminary, that the scale of numbers is not evenly divided, as in this case only addition and subtraction could be performed, but is divided in proportion, not to the numbers, but to their logarithms, so that 3, whose logarithm is very nearly the half of that of 10, stands almost halfway between 1 and 10; and similarly of the other numbers. All questions of numerical proportion can thus be easily worked by means of the line of numbers on the slider, and the adjacent and corresponding one on the fixed part of the rule. To find a fourth proportional to three given numbers, we place the first term (on the slider) opposite to the second term (on the fixed scale), and opposite the third term (on the slider) is the fourth or number required (on the scale). Multiplication is performed by making 1 the first term of a proportion, and division by making it the second or third. The other scales marked on the rule are useful in the solution of trigonometrical, geographical, and nautical problems, and the results obtained are much more accurate than one at first sight would believe. Sliding rules of circular form have been made by the French, but they are not in any way preferable to the ordinary straight form.

SLIDING SCALE, a provision in some of the statutory restrictions formerly in force on the trade in corn, by which, in order to encourage importation when prices were high, and discourage it when low, the import duty was diminished as the price rose, and at famine-prices grain came in duty free. By the act of 1828, wheat was allowed to be imported on payment of a duty of £1, 4*s*. 8*d*. when the average price over England was 62*s*. a quarter. For every shilling less of price, a shilling was added to the duty; and for a rise of price the duty decreased. In 1842, while the agitation regarding the corn-laws was going on, Sir Robert Peel introduced and carried a modification of the Sliding Scale, which, however, did not succeed in mitigating the popular hostility to the corn-laws. By the Sliding-scale Act of 1842, the duty per quarter was fixed at £1 when the price of corn was under 51*s*., and diminished as the price increased, till on the quarter of wheat attaining the price of 73*s*. it fell to 1*s*. See CORN LAWS.

SLI'GO, a maritime county of the province of Connaught, Ireland, bounded on the N. by the Atlantic and the Bay of Donegal, S. by Roscommon and Mayo, E. by Roscommon and Leitrim, and W. by Mayo. It is 41 miles from east to west, and 38 from north to south; the total area comprising 461,753 acres, of which 290,696 are arable, while 151,723 are uncultivated. The pop. in 1861 was 124,845, of whom 112,436 were Roman Catholics, and 10,438 Protestants of the Established Church.

The coast-line is very irregular, and indented with numerous bays, and, except in the Bay of Sligo, is rocky and dangerous for navigation. The surface rises gradually from the coast eastwards as far as an elevated range called Slieve Gamph and the Ox Mountains, the highest point of which rises to 1800 feet. S. contains comparatively few and unimportant lakes, but some of these, however, are extremely picturesque, especially Lough Arrow and Lough Gill. Only three of its streams are navigable—the Moy, the Owenmore, and the Garrogue, and they are all inconsiderable. The county is traversed by a railway, which is a branch of the Midland Great Western, and connects the county town of Sligo (q. v.) with Dublin. The mineral products of the county, although not very rich, are various, and consist of copper, lead, iron, and manganese. The climate is variable, and although rain is frequent, it is, on the whole, mild and healthy. The soil in the north is mossy and sandy, both being occasionally intermixed, and at times alternating with a gravelly loam. The plain of S. is a deep rich loam; and in the southern portion of the county are found large tracts of corn-land and pasturage. The occupations of the people are mainly agricultural, and, until some years back, they were chiefly engaged in tillage; but the land is now chiefly used for pasturage. The number of acres under crops of all kinds in the year 1862 was 103,301. The cattle in that year numbered 76,226; sheep, 44,717; and pigs, 18,062. The number of holdings ten years before 1852 had been 13,992, which is now somewhat reduced. The extent of coast-line has led a considerable number of the population to engage, at least partially and occasionally, in fishing. The S. fishery district comprises 112 miles of coast, and keeps engaged upwards of 200 registered vessels, employing more than 1200 men and boys. The principal towns are Sligo (q. v.), Ardnaree, and Tobercurry. The number of pupils attending the national schools throughout the county in 1864 was 8734, distributed over about 100 schools.

S. was anciently the seat of the O'Connors, and was the scene of many conflicts between the several branches of that family. The domestic feuds of the O'Connors were among the causes which facilitated the first inroads of the Anglo-Normans. The district contains many remains both of the Celtic and of the Anglo-Norman period. Of the former, there is one very interesting called the Giant's Cairn, near Sligo; and there are many raths, cromlechs, and ancient caverns. The county of S. sends two members to the imperial parliament.

SLIGO, chief town of the county of the same name, situated on the river Garrogue; distant from Dublin, with which it is connected by a branch from the Midland Great Western Railway, 131 miles north-west. The pop. in 1862 was 10,420; of whom 8242 were Roman Catholics, and 1557 Protestants of the Established Church. S. had its origin in the erection of a Dominican abbey in the 13th c. by Maurice Fitzgerald, Earl of Kildare, around which—and a castle also built by him—a town was gradually formed. In the reign of James I., it received a charter. The modern town stands within a bend of the river, chiefly on the left bank. It is for the most part well built, and contains several handsome public edifices. It possesses few important manufactures, but is a place of considerable commerce, which is directed with judgment and energy by a body of town and harbour commissioners. In 1863, 772 vessels, of 123,349 tons, entered and cleared the port. The exports are chiefly of corn, flour, meal, butter, provisions, and yarn. Steamers ply regularly between S. and Glasgow. The borough returns one member to the imperial parliament.

SLING, a weapon much in use before the introduction of firearms, consisted of a piece of leather, with a round hole in the middle, and two cords of about a yard in length. A round pebble being hung in the leather by the cords, the latter were held firmly in the right hand, and swung rapidly round. When the stone had attained great speed, one string was disengaged, on which the stone flew off at a tangent, its initial velocity being the same

as it had at the last moment of revolution. This velocity gives far greater range and force than could be imparted in mere throwing.

SLIP, in a Dockyard, is a smooth, inclined plane, sloping down to the water, on which a ship is built. It requires to have a very solid foundation. Among modern inventions is a slip on which a sort of truck runs on numerous rails. This truck is run under a ship as she floats; the water is diminished till she rests on it, and it is then hauled up the slip by steam power until she is high and dry. Such a slip takes the place of a dry dock. See also LAUNCH and SHIP-BUILDING.

SLIPPED, in Heraldry, a term of blazon applied to a leaf, branch, or flower, which is represented with a stalk, and torn from the parent stem.

SLOANE, SIR HANS, an eminent physician and naturalist, of Scotch parentage, his father having been the chief of the Scottish colony which was settled in Ulster by James I. of Great Britain, was born at Killyleagh, in County Down, Ireland, 16th April 1660. He devoted himself during his boyhood to natural history and medicine, and in spite of an attack of hæmoptysis, which lasted from his 16th till his 19th year, he arrived in London in 1679, with an excellent knowledge of the first of these sciences, and a fair acquaintance with the second. His apprenticeship to Stafforth, a pupil of Stahl (q v.), and the acquaintance, subsequently ripened into close friendship, which he formed with Boyle and Ray, two of the most celebrated naturalists of their time, did much to encourage and advance him in his favourite studies. During a brief sojourn in France, he attended the lectures of Tournefort and Du Verney, obtained on his return, by the active support of Sydenham (q. v.), a footing in London as a physician, and was elected a member of the Royal Society in 1685, and of the Royal College of Physicians in 1687; but in September of the latter year, he accompanied Monk, Duke of Albemarle, to Jamaica, and investigated the botany of that and the adjoining islands with such zeal and diligence during the 15 months of his stay, that his herbarium numbered 800 species. Resuming his professional practice on his return, he became physician to Christ's Hospital (1694—1724), President of the College of Physicians (1719—1735), Secretary to the Royal Society (1693), Foreign Associate of the French Academy of Sciences (1708), and succeeded Sir Isaac Newton as President of the Royal Society in 1727. He had been created a baronet and physician-general to the army in 1716; and in 1727 received the further honour of being appointed royal physician. Though of remarkably delicate constitution, he lived to the great age of 92, dying at Chelsea, 11th January 1753. The chief point to be remarked in S.'s moral character was his benevolence, as shewn in the charitable uses to which he applied the whole of his salary as physician of Christ's Hospital, in his zealous promotion of the various schemes for affording medicine and attendance gratuitously to the poor, and his support of the Foundling Hospital, of which he was one of the founders. By long-continued perseverance, he succeeded in forming a most extensive museum of natural history, a library of 50,000 volumes, and 3560 MSS., which he directed to be offered at his death to the nation for £20,000 (about one-fourth of its real value), and which formed the commencement of the British Museum (q. v.). He also contributed numerous memoirs to the *Philosophical Transactions*, whose publication he superintended for a number of years. But his great work was the *Natural History of Jamaica* (fol. 1707—1725), containing also an excellent account of the topography, meteorology, and population of the island, which book was the means of introducing into the Pharmacopœia a number of excellent drugs, hitherto unknown.

SLOBDO'SK, or **SLOBODSKOI'**, a town of Russia, in the government of Viatka, is situated on the river Viatka, about 16 miles north-east of the town of the same name. Pop. 5914.

SLOE, or **SLOE-THORN** (*Prunus spinósa*), a shrub of the same genus with the plum, and perhaps really of the same species with it and the bullace. It is generally a shrub of 4—10 feet high, sometimes becoming a small tree of 15—20 feet. It is much branched, and the branches terminate in spines. The youngest shoots are covered with a fine down. The flowers are small, snow-white, and generally appear before the leaves. The fruit is ovate, or almost globose, pale blue with blackish bloom, and generally about the size of the largest peas. The S. is abundant in thickets and borders of woods, and in arid places in Britain and almost all parts of Europe. The shoots make beautiful walking-sticks. Although spiny, the S. is not suitable for hedges, as its roots spread, and it encroaches on the fields. The bark is bitter, astringent, and tonic. The flowers, with the calyx, are purgative, and are in some places much used as a domestic medicine. The leaves are used for adulterating tea. The unripe fruit dyes black. The fruit is very austere. It is much used on the continent of Europe for making a preserve, also in some places for making a kind of brandy. An astringent extract, called *German Acacia*, is prepared from it, which was once much employed in cases of diarrhœa and mucous and bloody discharges. The juice is much used to impart roughness to port wine, and in the fabrication of spurious port.

SLO'NIM, a town of Russian Poland, in the government of Grodno, and 72 miles south-east of the town of that name. It has large manufactures of cloth. Pop. 8311.

SLOOP is a one-masted cutter-rigged vessel, differing from a cutter, according to old authorities, in having a fixed bowsprit and somewhat smaller sails in proportion to the hull. The terms 'sloop' and 'cutter' appear, however, to be used nearly indiscriminately. In the British navy, a sloop-of-war is a vessel, of whatever rig, between a corvette and a gun-boat, and ordinarily constituting the command of a commander. In the days of the sailing navy, sloops-of-war carried from 10 to 18 guns; but, with the introduction of steam, the number of guns has ceased to be distinctive.

SLOPS, in the Navy, are somewhat more extensive than 'necessaries' in the army. They comprise the clothes and bedding of a sailor. Within certain limits, government, acting through the ship's paymaster, supplies the men with slops at cost price. When a sailor dies, his slops are sold by auction for the benefit of his representatives.

SLOTH (*Bradypus*), a genus of mammalia, of the order *Edentata*, and family *Tardigrada*. The name was given from observation of the very slow and awkward movements of the animals of this genus on the ground; but a better acquaintance with their habits, and observation of their movements among the branches of trees, for which their conformation peculiarly adapts them, have shewn it to be by no means appropriate or descriptive. In like manner, Buffon's notion that they are creatures of imperfect organisation, and doomed to a miserable existence, has been completely exploded. Their structure, like that of every other creature, is admirably

adapted to their mode of life. They feed on the leaves, buds, and young shoots of trees, amongst the branches of which they are born and spend their whole life, rarely and unwillingly descending to the ground. They do not walk upon the branches, but cling beneath them, with the back downwards. The fore-legs are much longer than the hinder ones, and are used for embracing a branch, or for drawing in the branches on the foliage of which they are to feed, and both the fore and hind feet are furnished with very long, curved, and sharp claws. The pelvis is very wide; and the hind-legs, thus widely separated, also diverge from one another. The structure of the wrist and ankle-joints is such that the palm or sole is turned towards the body, so that upon the ground, the animal is compelled to rest on the side of the hind-foot, whilst the length of the fore-legs causes it to rest on the knee or elbow of them, struggling forward by a shuffling movement, and dragging itself along by stretching out the fore-legs alternately and hooking the claws into the ground, or grasping some object. But in a dense tropical forest, sloths generally find it easy to pass from the branches of one tree to those of another, often taking advantage for this purpose of a time when branches are brought within their reach by the wind. Where the trees are more distant from each other, they will eat up the whole foliage of a tree ere they descend from it. The hair of sloths is coarse and shaggy, of a very peculiar texture, inelastic, and much like grass



Three-toed Sloth (*Bradypus trydactylus*).

withered in the sun, but affords an excellent protection from insects, whilst it also gives them such an appearance that they are not readily observed except when in motion. The muzzle of sloths is short, and the tail is short. There are no incisor teeth, but sharp canine teeth, and eight molars in the upper, six in the lower jaw. The molars are cylindrical, penetrated by no laminæ of enamel, and adapted merely for crushing, not for grinding the food. For this, however, there is compensation in the stomach, which is somewhat imperfectly divided, by transverse ligatures, into four compartments, for the longer retention and more thorough digestion of the food, although there is no rumination. The female sloth produces only one young one at a birth, which clings to its mother till it becomes able to provide for itself. The voice of sloths is a low plaintive cry. Their chief enemies are large snakes, but against these they defend themselves by their powerful fore-legs and claws. A sloth has been known to grasp a dog round the neck and strangle it. There are very few species. One species has the fore-feet furnished with only two toes: the others have three. These, with other differences, have been made the ground of a recent division of the genus into two. The TWO-TOED S., or UNAU (*Bradypus* or *Cholœpus didactylus*), is about two feet in length, of a uniform grayish-brown colour, often with a reddish tint. The best-known species of THREE-TOED S. is the AI (*Bradypus* or *Acheus tridactylus*), which is smaller than the Unau, has a more obtuse muzzle, and is generally brownish gray, slightly variegated with hairs of different tints, the head darker than the body. All the sloths belong to the tropical parts of America.

SLOTTING-MACHINE, a machine for cutting slots, or square grooves, in metal. It is of great importance in mechanical engineering, and many very ingenious inventions have been made for facilitating the process. The principle is, however, very simple, and is the same in all. It consists of a cutting tool, or chisel, held very firmly in an arm, which is pressed down and raised alternately. The tool is thus made to pare off a thin portion of the metal each time it descends, until it has cut a slot of sufficient size. Water is continually thrown on, to prevent the metal from becoming overheated by the friction.



Slotting-machine.

SLOUGH, a village of England, in the county of Buckingham, 18 miles west of London, by the Great Western Railway. On the road between S. and Windsor, which is distant about two and a half miles, lived Sir William Herschel, and at the observatory which he erected here, in which was placed his great telescope, many of his important astronomical discoveries were made. Pop. (1861) 3425.

SLOVAKS, THE, are the Slavic inhabitants of North Hungary, who, in the 9th c., formed the nucleus of the great Moravian kingdom, but who, after the bloody battle of Presburg (907 A.D.), were gradually subjugated by the Magyars, to whom even yet they bear no friendly feeling. Their number is reckoned at 2,750,000, of whom 800,000 belong to the Protestant, the rest to the Catholic Church. The S., whose character probably comes nearest to that of the old Slavic type, travel in great numbers over Germany and Poland as pedlars. Their language is a dialect of Bohemian. Among the most notable of the Slovak authors are the poets Holly and Kollar (q. v.); Matth. Bel (1684—1749); Stephan Leschka (1757—1818), editor of the first Slovak journal; Bernolak, author of a Slovak grammar; Palkovitsh (died 1835); and Tablitsh, who published four volumes of poetry (1806—1812). A fine collection of popular Slovak ballads has been published by Kollar (2 vols., Ofen, 1834).

SLOW-MATCH, a combustible material, such as cotton, hemp, tow, &c., often dipped in a solution of nitrate of potash (saltpetre), and formed into a thin rope. It is used for exploding gunpowder in various ways, on account of its slow, steady way of burning, a sufficient length being taken to enable the operator to remove to a safe distance before the explosion. Slow-match was much used by artillerymen for firing of cannon, but it has generally given way to friction fusees and percussion caps.

SLUBBING. See SPINNING.

SLUG (*Limax*), a genus of gasteropodous molluscs, of the division *Monœcia* (hermaphrodite), and of the family *Limacidæ*, which is closely allied to the snail family, *Helicidæ*, but has no external shell. There

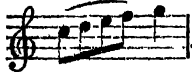
is, however, a rudimental shell, generally concealed within the mantle, placed over the respiratory cavity. The *Limacidæ* are diffused over the whole world. They commit great ravages among field and garden crops during moist weather. In frosts, they become



Slugs.
1. Gray slug; 2. Black slug; 3. The same full grown, and as it appears when at rest; 4. Its eggs.

dormant, taking shelter under clods and at the roots of plants. They lay eggs in clusters, in moist places, often at the roots of grass. The eggs resemble small oval bags of jelly. The body is generally oval or oblong, elongated. The foot is not distinct from the body. There are four retractile tentacles; the eyes are at the tips of the longer pair. Slugs often climb trees in quest of decaying vegetable matter on which to feed, and let themselves down by means of mucous threads, for the formation of which there is a small aperture at the hinder end of the body. Of British species, one of the most common is the GRAY S. (*Limax agrestis*), which is of a whitish ash colour; another is the GREAT GRAY S. (*L. maximus* or *antiquorum*), the largest British species; another is the BLACK S. (*L. ater*), often popularly called the Black Snail. The RED S. (*Agrion agrestis*) is also very plentiful. Careful gardeners often gather slugs by the aid of a lantern at night, and destroy them. They may also be killed by watering the ground with a weak solution of ammonia.

SLUR, in Music, an arch drawn over two or more notes *not* on the same degree, to indicate that these notes are to be played *legato*, or smoothly and fluently



In vocal music, a slur is placed over all the notes that are to be sung to the same syllable, unless where they are grouped together by a common line. A slur must be distinguished from a *tie*, which is a similar arch drawn over two notes on the same degree, and denoting that instead of the two notes written, one is to be played of the length of both.

SLUTSK, a town of Russian Poland, in the government of Minsk, about 63 miles south of the town of that name, near the source of the Lesser Slutch. With the exception of its public buildings, the houses are almost entirely of wood. Pop. 7490.

SMACK is a generic term for small decked or half-decked vessels employed in the coasting and fishing trade. The majority of smacks are, however, rigged as cutters, sloops, or yawls. According to Wedgewood, the *m* in this word is a corruption of *n*; the Anglo-Saxon has *snakk*, a small vessel, and there is a corresponding form in the other Teutonic and Scandinavian tongues.

SMALL-ARMS, in the modern acceptation, consist of the weapons actually carried by a man. They have been described under their respective heads, BAYONET, FIREARMS, LANCE, SWORD, PISTOL, &c.

SMALL-ARMS FACTORIES, ROYAL, are the establishments through which all the small-arms of every description are supplied to the regular army, the militia, yeomanry, and volunteers. The headquarters are at Enfield, where there is a vast manufactory; at Birmingham, there is a considerable establishment for viewing the arms supplied by contractors; and at Pimlico there is a factory for repairing damaged arms, and for training armourer-sergeants for detached service with regiments. For many years, there had been a small ordnance factory at Enfield Lock, where a few thousand muskets were laboriously forged by hand each year; but when the sudden introduction of the rifle, and the demands of the Russian war, called for a supply of arms, which the trade of all Europe and America was unable to meet, government determined to erect machinery for the fabrication of arms. For this purpose, the factory at Enfield was entirely remodelled; machinery of great power and delicacy was adopted, and now, when in full work, the factory can turn out daily 1000 complete and proved rifles, besides a corresponding complement of other small-arms. At the same time, the accuracy of workmanship is so great, that a hundred rifles might be taken entirely to pieces, the several portions thrown promiscuously together, and a hundred complete rifles could be instantly re-formed without any difficulty from the same pieces. Much of the merit of this great establishment is due to Colonel Manley Dixon of the Royal Artillery, who has superintended the factory since it has been remodelled. The success of the factory has reduced in a remarkable degree the cost of rifles, and has brought down correspondingly the price charged by the trade for the large quantities still intrusted to it.

The cost of the factories, when in full operation, is of course considerable. At present (1865), when the demand for small-arms is small, the annual charge is only £172,974.

SMALL DEBTS is a phrase current in Scotland to denote debts under £12, recoverable in the Sheriff Court. See SHERIFF. In England, the same debts are recoverable in the County Court (q. v.).

SMALLPOX, or **VARIOLA**, is one of the most formidable of the class of febrile diseases known as the *Exanthemata* (q. v.). All cases of regular smallpox are divisible into three stages—viz. (1), that of the initial or eruptive fever; (2), that of the progress and maturation of the specific eruption; and (3) that of the decline. Some writers make a primary stage of the period of incubation, or of the time intervening between the reception of the poison into the system, and the first appearance of febrile symptoms; but this is not entitled to be regarded as a stage of the disease, seeing that no symptoms of disorder have begun to shew themselves. The *first stage* begins with rigors, followed by heat and dryness of the skin, a quickened pulse, furred tongue, loss of appetite, pain in the pit of the stomach, with nausea, vomiting, headache, and often pains in the back and limbs. The violence of the pains in the back, and the obstinacy of the vomiting, are frequently very well marked and characteristic symptoms. In children, the disease is often ushered in by convulsions; while delirium sometimes attends its outset in adults. On the third day, minute red specks begin to come out first on the face, then on the neck and wrists, and on the trunk of the body, and lastly, on the lower extremities. The fever usually begins to subside as soon as the eruption appears, and by the

beginning of the fifth day, when the eruption is generally completed, the fever has entirely disappeared. The *second stage* commences when the eruption is fully out. Upon the second or third day of the eruption, a little clear lymph is seen in each pimple, which has increased considerably in size since its first appearance, and which is thus converted into a *vesicle*. The vesicles gradually increase in breadth, and become converted into *pustules*, which are at first depressed in the centre, but by the fifth day of the eruption become turgid and hemispherical; the suppuration on the face being complete by about the eighth day from the commencement of the fever, and the same process rapidly following in the other parts of the body in the same order of succession as that in which the eruption originally appeared. The pustules then break, and scabs or crusts form over them, which usually fall off after four or five days' existence. The number of pustules in any special case and the severity of the disease, stand in a direct ratio to one another; for 'the number of pustules indicates, in the first place, the quantity of the variolous poison which has been reproduced in the blood; and, in the second place, it is also a direct measure of the extent to which the skin suffers inflammation. Sometimes there are not more than half-a-dozen pustules; sometimes there are many thousands. If all these were collected into one, it would be an enormous phlegmon. For both these reasons, the system suffers commotion, distress, and peril, in proportion to the quantity of the eruption.'—Watson's *Lectures*, &c., 4th ed. vol. ii. p. 857. The progress of the pustules is usually accompanied with swelling of the skin of the face, with a painful sensation of heat and tension; the scalp is often swollen; soreness of the mouth and salivation usually supervene; and the patient exhales a peculiar and disagreeable odour. About the eighth or ninth day of the disease, a recurrence of the fever, known as 'the fever of maturation,' sets in with varying degrees of intensity, according to the number and arrangement of the pustules. When the pustules are numerous, they run together; when they are few, they keep separate. Hence the division of smallpox into the two great varieties of *distinct* and *confluent*, or *variola discreta* and *variola confluens;* and this division is of the highest importance, because the distinct form of the disease, in which the pustules are isolated, is scarcely ever dangerous; while the confluent form, in which they coalesce, is never free from danger. The *third* or *declining stage* is, in the distinct variety, little more than a period of convalescence. About the eleventh or twelfth day, the pustules on the face become brown and dry at the top, or some of them break, and the fluid which oozes out solidifies into a yellowing crust; and from this time the process of *desiccation* goes on, the swelling of the face subsides, and at last only dry scabs remain, which gradually fall off about the fourteenth day. It is not till three or four days after the scabs have formed on the face, that the same process is completed over the whole body. The scabs are usually completely gone by the twenty-first day, leaving behind them blotches of a reddish brown colour, which sometimes continue for some months before they quite disappear; and some of the pustules, in consequence of ulceration of the true skin, leave pits, especially on the face, which remain permanently. The period of scabbing is accompanied by various symptoms of improvement: the tongue becomes clean, the appetite returns, and by the time that the scabs have fallen off, the patient may be regarded as restored to health; so that the entire course of a case of distinct or discrete smallpox occupies about three weeks. In the confluent form of the disease, the eruptive fever is more violent, the pain in the back is more severe, and the sickness more obstinate, and the eruption comes out earlier and less regularly than in the distinct variety which we selected for description as representing the more natural course of the disease. Moreover, the pustules do not fill so completely, nor are they of the normal yellow purulent hue, being whitish, brown, or even purple. But the most important difference between the two forms is in the *secondary fever*, which sets in when the pustules are mature. This fever, which is slightly marked in distinct smallpox, is usually intense, and highly dangerous in the confluent form; and it is at this period of the disease that death most commonly occurs. Statistics shew that the eighth day of the eruption is the most perilous *day*, and the second week the most perilous *week*. The early occurrence of death—that is to say, during the first week—denotes a peculiar malignancy in the disease. 'The nervous system,' says Dr Watson, 'appears to be overwhelmed by the force of the poison. During the second week, the disorder proves fatal chiefly in the way of apnœa; from some affection of the respiratory passages. After that period, the characters of asthenia commonly predominate, the patient sinks under some casual complication, or the powers of life are gradually worn out by so much irritation of the surface, and so large an amount of suppuration.'—*Op. cit.*, vol. ii. p. 860.

The above are the essential symptoms of smallpox, both in the distinct and confluent form. This disease is, however, often accompanied by other symptoms, which we have merely space to name; such as sore throat (which often depends upon pustules situated there), salivation, and (in the confluent form, during the secondary fever) erysipelatous inflammation, leading to the formation of abscesses, glandular swellings, sloughing sores on the sacrum, &c. In pregnant women, the disease often causes abortion, which is most commonly followed by death. The dead child occasionally, but not often, is covered with pustules.

The *cause* of smallpox is universally allowed to be a specific contagion, of whose nature we are in the most profound ignorance. There is probably no disease so contagious as this. Dr Haygarth stated (in 1793) that, during his long attention to this subject, 'not a single instance has occurred to prove that persons liable to smallpox could associate in the same chamber with a patient in the distemper without receiving the infection; and he was informed by an American physician of an instance in which the poisonous effluvium crossed a river 1500 feet wide, and affected ten out of twelve carpenters who were working on the other side. The contagion acts either through the air, or by contact with the skin, or by inoculation; and the disease may be caused by the dead body, even when it has not been touched. What products of the diseased body are contagious, is not exactly known, but the contents of the pustules and the dried scabs certainly are so. Opinions are divided as to the period at which the disease begins and ceases to be contagious. It is safest to maintain that it is capable of self-propagation as soon as the febrile symptoms have exhibited themselves. How soon the patient ceases to be dangerous, cannot be decided with accuracy; but the stability of the contagious principle may be inferred from the fact, that clothing will retain it for months, and it is said for years, when confined. Like all the contagious exanthemata, smallpox appears in an epidemic form, at irregular, and, in our ignorance, it would almost seem capricious intervals. After an extraordinary exemption, perhaps

for years, a district is suddenly invaded by it, and continues to suffer for a longer or shorter period, after which the disease spontaneously disappears—dies out, as it were—and does not reappear perhaps for years. Different epidemics vary very much in their severity, and isolated cases are usually milder than those occurring when the disease is epidemic. Race has much to do with the severity of the disease; the constitution of the dark races, the Negro and the Red Indian, being singularly susceptible of the contagion, and exhibiting very little power of resisting the fatal tendency of the disease.

It is universally admitted that the discovery of *Vaccination* (q. v.), by which smallpox is deprived of its danger, is the greatest triumph of modern medicine. *Inoculation* (q. v.) protected the individual, but increased rather than diminished the total number of deaths, while vaccination has the advantage of protecting both the individual and the community. Although, in the great majority of cases, vaccination affords perfect protection against smallpox, it not very unfrequently happens that vaccinated persons, when exposed to the contagion of smallpox, get the disease in a modified form, milder and shorter even than after inoculation, and therefore incomparably milder than in the natural form. The disorder occurring under these circumstances has received the various names of *modified* or *post-vaccinal* smallpox, or the *varioloid* disease. As Dr Wood observes: 'It is impossible to describe minutely all the shapes which the varioloid disease assumes. There is every shade between the slightest symptoms, scarcely recognisable as having affinity with smallpox, and the nearest possible approach to the regular disease.'—*Practice of Medicine*, 4th ed., vol. i. p. 380. In whatever form the varioloid disease appears, it wants the peculiar odour of smallpox, and secondary fever is very rare. The constitutional disturbance which, for the first week, may have been as severe as in the true disease, usually subsides entirely when the eruption has reached its height, and the patient is convalescent at the period when, if he had not been vaccinated, he would have been in the greatest danger.

With regard to prognosis, it may be stated generally, it is a very fatal, and was formerly an extremely destructive disease—one death occurring in every four cases. Modified smallpox is very seldom fatal, although instances of death are occasionally reported. Smallpox is more fatal at the two extremes of life than in the intervening period, and, as has been already noticed, is especially dangerous in pregnancy. In olden times, it was believed that the eruption was an effort of nature to get rid of the noxious matter, and hence heating and stimulating measures were adopted with the view of promoting the eruption. To Sydenham (q. v.) belongs the credit of first recommending an entirely opposite or cooling mode of treatment; but his suggestions met with the most severe opposition, and it was not till long after his death that the cooling treatment was fairly established. In mild cases, and in cases of varioloid disease, the physician has merely to guard the patient against hurtful influences, such as stimulating foods or drinks, too hot a room, or improper exposure to cold, and to prescribe cooling drinks during the fever, and occasional laxatives if they shall be required. In more severe cases, the fever may be combated by saline purgatives, prescribed so as to produce two or three liquid stools daily, and by free ventilation of the surface of the body. When the eruption is all out, if the pimples on the face are few and distinct, the danger may be regarded as over, and no further treatment is required. If, however, the disease assume a confluent form, wakefulness and restlessness are apt to come on about the eighth day, and opiates in free doses may be prescribed with benefit. If the pustules are abnormally torpid in reaching their maturity, it may be expedient to administer strong broths, or even wine; and when the pustules are livid, and intermixed with Petechiæ (q. v.), bark and acids must be additionally ordered, although the patient is then too often beyond the reach of help. During the secondary fever, the bowels must be kept gently open, and opiates should be prescribed once or twice each day. A more nourishing diet is now called for, and wine should be given if the pulse is very weak. The external itching is partly relieved by the opiates, but local applications are also employed: cold cream, or a mixture of equal parts of olive oil and lime-water, may be thus used with advantage. Special methods have been devised for the purpose of preventing the pitting or seaming of the face, which is often a hideous permanent disfigurement to the patient. The best application of this kind is probably that of nitrate of silver. Mr Higginbottom, who first suggested this application, touches each distinct papula with a solid stick of lunar caustic, previously moistened; but when the spots are confluent, he washes the whole face, about the third day after the eruption, with a strong solution of this salt, containing eight scruples to the ounce of water. In the Paris hospitals, various mercurial preparations are employed, which are said to cause the pustules to abort. M. Briquet recommends mercurial ointment simply thickened with powdered starch. Dr Wood of Philadelphia remarks, that as the ointment sometimes salivates, it should be diluted with an equal quantity of lard before the starch is added. Professor Bennett of Edinburgh recommends the application of calamine (carbonate of zinc) mixed with olive oil; it forms a coherent crust, and thus excludes the air.

During the period of desquamation, an occasional warm bath may be prescribed with advantage; and the patient should always resort to this measure, as a precaution against carrying the contagion about with him, before again mixing in society.

The history of this remarkable disease is clothed in considerable obscurity. There is no evidence that it was known to the Greek or Arabian writers of the 6th c., and the first accurate description of it is that of Rhazes, an Arabian physician, who flourished early in the 10th century. It appears to have reached England towards the close of the 9th century. After the Crusades, it prevailed in most of the temperate countries of Europe, but did not reach the northern countries of Norway, Lapland, &c. for some time later. In 1517, it was carried from Europe to St Domingo; and three years later, it reached Mexico, where it committed fearful devastations, and whence it spread with intense virulence throughout the New World. (According to Robertson, three millions and a half of people were destroyed in Mexico alone.) In 1707, it was introduced into Iceland, when more than a fourth part of the whole population fell victims to it; and it reached Greenland still later (in 1733), when it spread so fatally as almost to depopulate the country. These cases are striking illustrations of the law that seems universally true, that a contagious disease is always most virulent on its first introduction to a new scene of action.

SMALLPOX IN SHEEP (*Variola ovina*), although resembling the smallpox of men, is a distinct disease, not communicable, either by contagion or inoculation to men or children, or even to dogs or goats. Although common on the continent of Europe, it was unknown in this country for at least a century, until in 1847 it appeared in Norfolk

and the eastern counties, and in the summer of 1862 in Wiltshire, near Devizes. Variolous sheep or infected skins appear in both cases to have imported the disease from abroad. About ten days after exposure to contagion, the infected sheep become feverish, have a muco-purulent nasal discharge, and a hot tender skin. The red pimples which first appear, in about three days become white, and afterwards leave scabs or ulcers. The weakness is great, and the mortality varies from 25 to 90 per cent. Good food and nursing are the appropriate remedies. Promptly and carefully must the sick be separated from the sound; but if the spread of the disorder be not thus immediately checked, the whole of the sound flock should be inoculated. The disease thus artificially produced appears in ten days, runs a mild course, occasions a loss of from two to five per cent., and in three weeks the disorder is got rid of, and all risk of contagion over.—Further details will be found in Professor Simmonds' 'Report on Smallpox,' in vol. 25 of the *Journal of the Royal Agricultural Society of England.*

SMALT, a name applied to the coloured glass compositions used for making the tesseræ employed in forming mosaics. See also COBALT.

SMART-MONEY. See RECRUITING.

SMEATON, JOHN, an eminent civil engineer, was born at Austhorpe, near Leeds, in 1724, and early shewed a bent towards mechanical pursuits. At the age of 15, he had constructed a machine for rose-engine turning. About 1750, he removed to London, to commence business as a mathematical instrument maker; but we find him in the following year resuming his desultory experiments in mechanical invention, an 'odometer' for ships, a compass, and improvements in water and wind mill-machinery being the chief products of his inventive genius. His improvements on mill-work were found on trial to be of great value, increasing the effective force by one-third, and gained S. the Copley Medal of the Royal Society in 1759. In 1753, he was chosen a member of the Royal Society; and in the following year, to extend his practical acquaintance with engineering, he visited the Netherlands, and inspected the embankments, canals, and other remarkable works of that country. In 1755, an event occurred which was to afford him the opportunity of attaining the very summit of his profession—the second wooden light-house on Eddystone rock was destroyed by fire in December. The speedy re-erection of another beacon was of the utmost importance, and the execution of the work was intrusted to Smeaton. The new light-house was built of stone; the cutting of the rock for the foundations commenced in August 1756, the building was executed between June 1757 and October 1759, and the lantern lighted on 16th October of the latter year. This great work, the greatest of its kind hitherto undertaken, remains to this day a stable monument of S.'s engineering skill. Yet he seems to have had little employment for some time subsequently, as he applied for and obtained in 1764 the post of 'receiver of the Derwentwater estate,' the funds of which were applied for the behoof of Greenwich Hospital; and this situation he held till 1777, by which time he was in full professional employment. The chief of his other engineering works were, the construction of the greater portion of Ramsgate harbour (1774); the laying out of the line of the Forth and Clyde Canal, and the superintendence of the excavation of most of it; the rendering of the Calder (Yorkshire) navigable; the erection of Spurn light-house, and of several important bridges in Scotland, together with an immense amount of mill-machinery. He also greatly improved Newcomen's steam-engine, but the mighty achievements of Watt in the same field threw his labours completely into the shade. He is said to have prevented the fall of the old London Bridge for many years by sinking a great quantity of stones around one of the piers, which had become undermined by the strength of the Thames current. In 1783, his health began to decline, and he retired from active business, dying at Austhorpe of paralysis, 28th October 1792. He was one of the chief promoters of the 'Society of Civil Engineers,' which was started in 1771, and after S.'s death published (1797) in three 4to volumes his numerous professional Reports, which were regarded by his successors 'as a mine of wealth for the sound principles which they unfold, and the able practice they exemplify.' For a large portion of his life S. was in constant attendance on parliament, which, in difficult or important engineering schemes, invariably demanded, and almost always followed, his advice—a proof not only of his eminence in his profession, but of his caution, judgment, and integrity. See the biography prefixed to his 'Reports.'

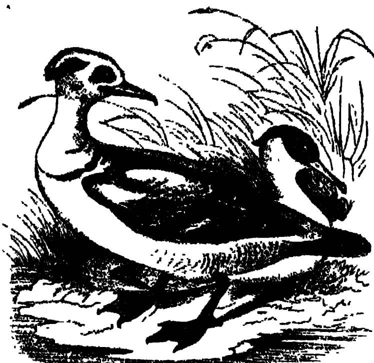
SMELL. See NOSE.

SMELT (*Osmerus*), a genus of the Salmon or Trout family (*Salmonidæ*), of which only a few species are known, differing from the salmon, trout, &c. in having long conical teeth on the jaws and tongue, and on the tip of the vomer, the rest of the vomer being destitute of teeth; two distinct rows of teeth on each palatine bone.—The COMMON S. (*O. eperlanus*), called *Spirling* or *Sparling* in Scotland, and *Eperlan* in France, is a fish of 8 or 10 inches (rarely 12 inches) in length. The form is very trout-like—rather more slender—the tail larger in proportion, and more forked. The lower jaw is much longer than the upper. The scales are small; the back is whitish, tinged with green; the upper part of the sides shews bluish tints, the lower part of the sides and the belly are of a bright silvery colour. The S. has a peculiar, cucumber-like smell, and a delicious flavour, on account of which it is highly esteemed for the table, where it often appears as an accompaniment of other fish. The S. is partly an inhabitant of fresh water, and partly of the sea. It ascends rivers to no great distance from the sea in autumn, and descends in spring. Great numbers of smelts are taken in estuaries, and near the mouths of rivers, by small-meshed nets. They are also taken on the open sea-coast, chiefly on low sandy shores, as that of Lincolnshire. The attempt has been successfully made to keep the S. continually in fresh-water ponds, in which it not only throve well, without loss of flavour, but propagated abundantly. No effort has yet been made to turn this discovery—not a very recent one—to any economical account. Although found both on the eastern and western coasts of Britain, the S. is unknown on the south coast of England, where the name S. or SAND S. is given to the Atherine (q. v.)—Another British species, the Hebridean S. (*O. Hebridicus*), was first discovered near Rothesay in 1837, and described by Yarrell. It is so rare as to be unimportant.—The AMERICAN S. (*O. viridescens*) is regarded as distinct from the Common Smelt. It has a longer body and a greener back. It is found on the north-eastern coasts of America, as far south as the Hudson.

SMELTING. See IRON.

SMEW (*Mergellus albellus*), a bird of the family *Anatidæ*, very nearly allied to the goosander and mergansers, but having a shorter bill. The whole length of the male is not quite 18 inches; that of

the female, not quite 15. The S. is only known in Britain as a winter visitant, appearing in greatest numbers in severe winters, and sometimes on



Smew (*Mergellus albellus*).

inland lakes and ponds, as well as on the sea-coast. It abounds on the northern coasts of Asia, and in some parts of continental Europe.

SMILA'CEÆ, a natural order of exogenous plants, ranked by Lindley in his class Dictyogens (q. v.), and consisting of herbaceous or half-shrubby plants, generally more or less climbing, with reticulated leaves, and bisexual or polygamous flowers, a 6-parted perianth, six stamens, a free 3-celled ovary, with cells one or many seeded, three stigmas, and a roundish berry. There are about 120 known species, mostly of the genus *Smilax*, scattered over the globe, but most numerous in the temperate and tropical parts of Asia and America. The root-stocks (*rhizomes*) of many species yield Sarsaparilla (q. v.). But some species have fleshy tubers, particularly *Smilax China*, a native of China and Japan, the tubers of which are very large and nutritious, and used for food. *Smilax pseudo-China*, an American species, has similar tubers.—The roots of *Roxburghia viridiflora*, after being boiled and soaked in lime-water, to remove their acridity, are preserved in syrup as an article of food in the Eastern Peninsula and Malayan Islands. The stems of this plant are sometimes 100 fathoms long.

SMITH, ADAM, the founder of political economy as a separate branch of human knowledge, was born in the town of Kirkcaldy, in Fifeshire, on the 5th of June 1723. His family belonged to the respectable middle class of Scotch life; his father was comptroller of the customs at the port of Kirkcaldy, and his mother, Margaret Douglas, was the daughter of a small Fifeshire laird. His father died a short time before his birth, and he was the object of the care and solicitude of a widowed mother, to whom he was closely attached, and who long lived to be proud of his attainments. When he was no more than three years old, the poor woman got a sad fright, from a calamity hardly known at the present day—the child was stolen by gipsies; but he was tracked and recovered by his uncle as they were seeking a hiding-place in the neighbouring wood of Leslie. This was the only adventure in his quiet life. After getting the usual burgh-school education in Kirkcaldy, he was sent, in 1737, to the university of Glasgow. He there secured an exhibition on the Snell foundation, which took him to Balliol College, Oxford. He studied there for seven years, and left traditions as of a man of large acquirements and peculiar independence of thought. It is said that he was intended for the English Church, but if so, his own convictions crossed the designs of his friends. He returned to Kirkcaldy, and lived for a while with his mother there in undisturbed seclusion and study. It was said to be his practice to stand ruminating, with his back to the fire, and his head leaning against the chimney-piece—and over an old fireplace in Kirkcaldy it used to be shewn how he had thus worn a piece off the paint. In 1748 he came to Edinburgh, where silently and unostentatiously he became one of the brilliant little circle of men of letters who were then rising to importance. In 1751, he got the chair of Logic in the university of Glasgow, and this was changed a year afterwards for that of Moral Philosophy. In 1759, appeared his *Theory of Moral Sentiments*, celebrated for its reference of the mental emotions to the one source of sympathy. The *Dissertation on the Origin of Languages* was published along with the later editions of this book. Both had a great reputation in their day, and although they are now among obscure books in comparison with that other by which the author's name is remembered, the position they held with respectable thinkers gave a hearing to his doctrines on political economy which they would hardly have otherwise obtained. In 1762, the university of Glasgow gave him the degree of Doctor of Laws. In the following year he undertook a task, which might at first seem very uncongenial to a mind like his, given to retired study and independent thought and action. He became 'governor' or travelling tutor to the young Duke of Buccleuch. He was then sedulously collecting materials for his great work, and no doubt the inducement to accept of the office was the opportunity it gave him for travelling and seeing for himself. He had the opportunity of being nearly a year in Paris, and of mixing in the circle of renowned wits and philosophers of the reign of Louis XV. In 1766, his function came to an end, and he returned to Kirkcaldy to live in the old house with his mother. The year 1776 was an era in the history of the world as well as that of the Kirkcaldy recluse, in the appearance of the *Inquiry into the Nature and Causes of the Wealth of Nations*. If there was any living man to whose works he was indebted for the leading principles of this book, it was David Hume, and it was from him, as best understanding the fulness and completeness of the exposition, that it had its first emphatic welcome. He wrote immediately on receiving it: 'EUGE BELLE.—DEAR MR SMITH—I am much pleased with your performance; and the perusal of it has taken me from a state of great anxiety. It was a work of so much expectation by yourself, by your friends, and by the public, that I trembled for its appearance, but am now much relieved. Not but that the reading of it necessarily requires so much attention, and the public is disposed to give so little, that I shall still doubt, for some time, of its being at first very popular. But it has depth, and solidity, and acuteness, and is so much illustrated by curious facts, that it must at last take the public attention.' This was not destined to be exactly the literary history of this great work. Its startling doctrines, fine clear style, and abundant illustration from curious facts took at first; but counteracting influences arose when people saw how far the new doctrines went in playing havoc with old prejudices. The French revolution set the mind of this country bigoted against everything that breathed of innovation. It was known that the younger Pitt participated at first in S.'s free-trade notions, but he had afterwards, whether from permanent connection or temporary policy, to put himself in the foremost ranks of the enemies of innovation. It was not until long after

the terrors of that epoch and the nervous vicissitudes of the war had passed over, that S.'s work had an opportunity to revolutionise the public mind on matters of trade and finance. It came up, as it were, the leader of a great literary host, for expounders had crowded in numbers round *The Wealth of Nations* as the text-book of sound economy. Of a book so well known and so much read, it is needless to speak. The only reproach brought against it is, that it is not systematic in its form, and that its nomenclature is not exact. But its author was not arranging the results of established knowledge—he was rather pulling down existing structures, compounded of ignorance and prejudice. Nor, indeed, have those who have attempted to make an exact science out of political economy, practically vindicated the reproach they have cast on him of being unmethodical. Whatever we may yet come to, very few portions indeed of political economy admit of being treated as exact science. It is too closely connected with human passions and energies, and consequently with special results and changes, to be so treated; and the best books on the subject are still characterised by the discursiveness and mixed philosophy and fact of the *Wealth of Nations*. In 1778, S. was made a Commissioner of Customs. The only effect of this was to bring him to Edinburgh, and increase his means for indulging in his favourite weakness, the collection of a fine library; for he was, as he called himself, a 'beau in his books.' In 1784, he suffered that affliction which was sure to come if he lived long enough for it—the loss of his worthy mother. He followed her six years afterwards, dying in July 1790.

SMITH, ALEXANDER, poet, was born at Kilmarnock, in Ayrshire, December 31, 1830, received, as a boy, a fair English education, and passed from school into a Glasgow warehouse as a pattern designer. While following this occupation, he began to write poetry. His first volume, entitled the *Life Drama*, was published in 1853, and created something like a furor in literary circles. A reaction, however, followed, and the author had scarcely found himself famous when he began to be abused. The faults of his book were obvious enough: every page contained evidence of immaturity, and its natural result, extravagance; while a rather narrow reading having made him passionately attached to a few modern poets, as Keats and Tennyson, their peculiar turns of expression reappeared in his verse, and gave colour to the charge of plagiarism, which was pushed to an absurd length. But impartial critics were not slow to perceive a richness and originality of imagery that more than atoned for all defects of taste and knowledge. In 1854, S. was appointed Secretary to the university of Edinburgh, an office which he still holds; and in the following year, along with Sydney Dobell (q. v.), produced a volume of *Sonnets on the War*. Since then he has written *City Poems* (1857), *Edwin of Deira* (1861), and several prose works, as *Dreamthorp* (1863), *A Summer in Skye* (1865), and *Alfred Hagart's Household* (1865). S. is perhaps destined to achieve a higher reputation in prose than verse.—The style of his contributions to the magazines is distinguished by picturesqueness, polish, and originality.

SMITH, JAMES AND HORACE, authors of *The Rejected Addresses*, were sons of an eminent London solicitor. James was born February 10, 1775, died December 24, 1839; Horace was born December 31, 1779, died July 12, 1849. James followed his father's profession, and succeeded him as solicitor to the Board of Ordnance; Horace adopted the profession of a stock-broker, and realised a handsome fortune, on which he retired with his family to Brighton. Both were popular and accomplished men—James remarkable for his conversational powers and gaiety, and Horace (the wealthier of the two) distinguished for true liberality and benevolence. The work by which they are best known is a small volume of poetical parodies or imitations, perhaps the best in the language. On the opening of the new Drury Lane Theatre in October 1812, the Committee of Management advertised for an address to be spoken on the occasion, and the brothers Smith adopted a suggestion made to them, that they should write a series of supposed 'Rejected Addresses.' They accomplished their task in the course of a few weeks—James furnishing imitations of Wordsworth, Southey, Coleridge, Crabbe, Cobbett, &c.; while Horace contributed imitations of Scott, Byron (all but the first stanza), Monk Lewis, Moore, and others. In point of talent, the authors were about equally matched; for though James had the greater number of successful imitations, the one by Horace of Scott, is the most felicitous of the whole. It is a curious fact in literary history that a work so exceedingly popular should have had great difficulty in finding a publisher; and that the copyright, which had been originally offered to Murray for £20, and refused, was purchased by him in 1819, after the book had run through 16 editions, for £131. The authors received above £1000 from the sale of the work. James was afterwards an occasional contributor to the periodical literature of the day, and author of the humorous theatrical entertainments of Charles Mathews (for which he received £1000). Horace S. wrote several novels—*Brambletye House*, *Tor Hill*, &c.

SMITH, JOSEPH. See MORMONISM.

SMITH, REV. SYDNEY, a celebrated wit and humorist, and the original projector of the *Edinburgh Review*, was born at Woodford, in Essex, in 1771. His father was an eccentric English gentleman of moderate independence; his mother was the grand-daughter of a French refugee; and Sydney, it was said, fairly represented both nations. He was educated at Winchester School and New College, Oxford, and having entered the church, became curate of Amesbury in Wiltshire. 'The squire of the parish,' he says, 'took a fancy to me, and requested me to go with his son to reside at the university of Weimar; before we got there, Germany became the seat of war, and in stress of politics, we put into Edinburgh, where I remained five years.' During this time, he officiated in the Episcopal chapel there, and published *Six Sermons*, 1800. In conjunction with a few accomplished literary associates—Jeffrey, Horner, Brougham, Dr Thomas Brown, Playfair, &c.—S. started the *Edinburgh Review*, the first number of which appeared in October 1802, constituting a new era in the history of periodical literature, and of independent thought and criticism in this country. In 1803, S. removed to London, and was soon popular as a preacher, as a lecturer on moral philosophy (1804—1806), and as a brilliant conversationist, the delight and wonder of society. Church preferment, however, came slowly. In 1806, during the short reign of the Whigs, he obtained from Lord Erskine, when Lord Chancellor, the rectory of Foston-le-Clay, in Yorkshire; some 18 years afterwards, the Duke of Devonshire gave him the living of Londesborough, worth £700 per annum, to hold until Mr Howard, son of the Earl of Carlisle, came of age. In 1828, Lord Chancellor Lyndhurst presented him to a prebendal stall in Bristol, and enabled him to exchange Foston for Combe Florey, a more desirable rectory in Somersetshire. In 1831, Earl Grey appointed him one of the Canons Residentiary of St Paul's;

and this completed his round of ecclesiastical preferments. He sighed for a mitre, but it never came; and Lord Melbourne is said to have regretted this omission in his career as Prime Minister. The writings of S. subsequent to 1800 were his contributions to the *Edinburgh Review*, which he collected and republished, with other miscellaneous works, in 1839; *Peter Plymley's Letters*, written in 1807, to promote the cause of Catholic emancipation, and abounding in wit and irony worthy of Swift; *Sermons* in two volumes, 1809; *Speeches on the Catholic Claims and Reform Bill*, 1825—1831; *Three Letters to Archdeacon Singleton on the Ecclesiastical Commission*, 1837—1839; *The Ballot*, a political pamphlet, 1837; *Letter to Lord John Russell on the Church Bills*, 1838; *Letters on Railways*, 1842; *Letters on American Debts*, 1843; &c. Though gay, exuberant, and witty to the last, S. suffered from periodical attacks of gout and other complaints, and he died on the 22d of February 1845. Ten years afterwards, his daughter, wife of Sir Henry Holland, physician, published a Memoir of her father, with a selection from his letters.

The works of S. were mostly written on temporary topics and controversies, yet they bid fair to take a permanent place in our literature as specimens of clear and vigorous reasoning, rich unctuous humour, and solid good sense. His jokes, exaggeration, and ridicule are all logical, driving home his argument; and his wit was sportive, untinctured with malice. His views on political and social questions were moderate, wise, and practical; and he lived to see most of them realised. He erred at times in treating sacred subjects with levity and seeming irreverence; but this fault was one of natural temperament, and had no root in infidelity. He was a sincere, benevolent, and good man, a true patriot, and a happy Christian philosopher.

SMITHFIELD. This name has become so celebrated, in connection with a cattle-market in London, that it has been applied to similar establishments elsewhere. S., in the 12th c., was an open spot which served the citizens as a playground and a place for a stroll. Being a little north of Newgate, and west of Aldersgate, it was outside the city walls. It was in S. that the rebel Wat Tyler met his death in 1381. Several noted tournaments were held here; and the place is associated with trials by battle, the burnings of martyrs, public executions during many centuries, and a variety of incidents connected with the history of the metropolis.

The most celebrated fair in England, Bartholomew Fair (q. v.), was always held in Smithfield.

A cattle-market was held in S. at least seven centuries ago, for Fitzstephen mentioned it in 1150. The corporation had official control over the market for more than 500 years, dating from 1345; and the city authorities have never to this day relaxed their hold over the one only live-cattle market in the metropolis. At one time, there was a project for removing the market to a field near Sadlers' Wells, at another, to a spot near the north end of Gray's Inn Lane; while a spirited projector spent £100,000 in building a new market at Islington; but powerful influences prevented the removal of the cattle-market until 1855. The last market-day in the old spot was on June 11th in that year; after which, the trade was transferred to the large and very complete establishment built by the corporation at Pentonville. Since that day, S. has been of very little practical use. Many conflicting propositions have been made for its appropriation during the last ten years; but it is only now (January 1866) that the plans are definitely arranged. Three railways, sunk deeply below the ground level, occupy parts of the area—one going eastward to Aldersgate and Finsbury, one southward to Ludgate and Blackfriars, and one north-westward to King's Cross and the north of London. In convenient proximity to these, will be a magnificent Dead-meat Market, from the designs of Mr Horace Jones, the city architect; it will be an architectural pile 620 feet long by 240 broad, traversed by numerous avenues, and having 200 shops for dealers in meat, mostly country-killed. This arrangement will enable the city authorities to abolish Newgate and Leadenhall markets, which have became serious obstructions to city traffic. At another part of S., will be a circular spiral road, to give descent to an underground goods-station. The remainder will be laid out in well-paved carriage and foot ways, with possibly a small ornamental green or enclosure opposite St Bartholomew's Hospital. When these improvements are all completed, S. will have thoroughly changed its appearance, as much so as any other spot in London.

SMITHSO'NIAN INSTITUTE, at Washington, District of Columbia, U. S., was organised by act of Congress in 1846, in accordance with the will of James Smithson, who bequeathed the reversion of an estate amounting to 515,169 dollars to the United States of America, to be devoted to 'the increase and diffusion of knowledge among men.' He was an Englishman, a natural son of Hugh, third Duke of Northumberland, and Mrs Elizabeth Macie, a niece of Charles, Duke of Somerset. He devoted his life to scientific pursuits, especially to chemistry, and died at Genoa in 1829. The Institute is governed by regents appointed by the Federal government, and has erected a spacious edifice, with museum, library, cabinets of natural history, and lecture-rooms, which occupies a prominent situation at Washington, the capital of the United States. It receives copies of all copyright books, and exchanges with other countries, and its museum is enriched with the gatherings of national exploring expeditions. A portion of its funds is devoted to scientific researches, and the publication of works too expensive for private enterprise. Under the active management of Professor Joseph Henry, the secretary, have been organised departments of Astronomy, Ethnology, Meteorology, and Terrestrial Magnetism. Among the publications already issued are the *Smithsonian Contributions to Knowledge*, 13 vols. 4to, distributed gratis to libraries; *Annual Reports*, and *Miscellaneous Collections*. The courses of public lectures by eminent scientific men are among the attractions of the American capital.

SMOKE-NUISANCE, in London, is punishable with fine. The act applies to every furnace employed in working engines by steam, and every furnace in any mill, factory, printing-house, dye-house, distillery, bake-house, &c., which is not constructed so as to consume its own smoke, or which is so negligently used that the smoke is not consumed. The penalty is from two to five pounds. The statute only applies to the metropolis and to the river Thames. In Scotland, a similar act is not confined to the Scotch metropolis.

Experience has already demonstrated that it is not impracticable, with skilful construction of furnaces, and careful management of fuel, to reduce the evil to such small proportions as to be scarcely worthy of notice; but, excepting in those towns where the law has been rigorously asserted, the nuisance continues to be a disgrace to the sanitary condition of our towns, and to our national character for cleanliness. The first conditions for smoke-consumption are—such an arrangement of the furnace as to insure a supply of atmospheric air sufficient for complete combustion, and a judicious

disposal of the fuel itself, in order that the vaporised carbon may be brought in contact with the air in a sufficiently hot condition. The first of these depends upon the construction of the furnace, the latter upon the care and skill of the fireman. The fireman who properly attends his fire keeps it pretty equally distributed as an even bed of burning coal over the fire-bars, and when a fresh supply of fuel is required, instead of throwing it in as far as possible over the burning surface, he piles it up near the furnace-door, as in fig. 1, which represents a common

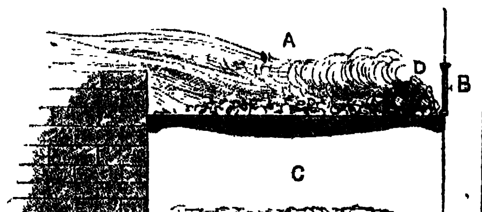


Fig. 1.

furnace, A the fire, B the door, and C the ashpit. The pile of coal, D, being acted upon by the heat, soon gives out its volatile products, and these passing over the intensely hot surface of the partially consumed fuel, are raised to the temperature necessary for combining with the oxygen of the air mixed with them. Thus with careful firing even an ordinary furnace will produce comparatively little smoke. This effect, however, may be heightened by special contrivances in the construction of the furnace. Mr Wye Williams of Liverpool, who has devoted a large portion of his life to this subject, and who has had very large opportunities of experimenting on a grand scale, has pointed out great improvements in the construction of furnaces, the chief principle of which is to bring the atmospheric air into contact with the fuel in a heated state, and to make the fire itself heat the air which is coming to supply it. This arrangement will be best understood by the drawing, fig. 2, which represents one of Mr Williams's

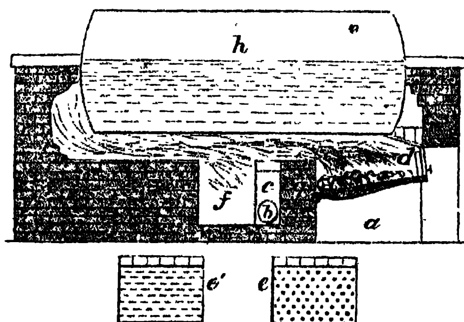


Fig. 2.

furnaces under a boiler, *h*. The fire is fed, as usual, through the door at *d*; it slopes downward to the bridge *g*, which rises much above the fire-bars, so that the flames have to pass over it. The bridge consists of two parts, the solid masonry or brickwork, *g*, and the chambered portion behind it, *c*, called the distributer. Into this a tube, *b*, opens through which a supply of atmospheric air enters, and becoming heated, passes through a number of plates with slits, or with perforations, as shewn in *ee'*, into the mixing-chamber, *f*; here the heated air enters into combustion with the carbon in the smoke-laden flame, deprives it of that element, and greatly increasing the heat by its combustion. Mr Williams, as managing director of the Dublin and Liverpool Steam-navigation Company, has had ample means of testing the value of the invention in his Company's works and vessels, and has realised the most successful results. His essay on the subject received the prize of the Society of Art, and its principles are very largely adopted.

Of plans depending upon the slow and regular admission of the fresh fuel by means of machinery, it will be sufficient to notice that of Jukes. His grate-bars are endless chains passing over rollers, and moved forward about an inch per minute. The coal employed is common siftings or screenings, which is heaped on the bars outside the furnace-door, which slides upwards. The door is left a little open, and by passing under it, the small coal is spread uniformly over the bars. The air is constantly supplied through the bars directly to the fuel while burning, and in this way perfect combustion is obtained. The bars, being slowly moved on, carry the ashes to the ashpit, which lies at the back of the grate. Jukes's apparatus was applied to the furnace of the engine which prints this work in 1848, and has been completely successful; it is rare that a single particle of smoke can be seen issuing from the chimney, and the saving in coal and attendance is decided.

SMOKE-STACK, in a steam-vessel, is the group rising above the deck, and comprising the Funnels (q. v.), and the several escape-pipes for the steam, which are beside it. In ships-of-war, all these are frequently made telescopic, that they may be drawn down out of danger in action or in a strong head-wind.

SMOLE'NSK, a government of European Russia, bounded on the east by the governments of Moscow and Kaluga. Area 21,380 sq. miles. Pop. (1864) 1,137,212. S., which is watered by the Dnieper, Dvina, Gshat, Oka, Iput, &c., is one of the most fertile provinces of the empire, and produces great quantities of corn, hemp, and flax. Extensive forests yield splendid timber and mast. The rearing of swine is much followed. Manufacturing industry and export trade are both largely expanding.

SMOLENSK, a fortified town of Russia, capital of the government of the same name, is picturesquely situated on a range of steep declivities overlooking the river Dnieper, 250 miles west-south-west of Moscow. It is one of the oldest towns in the empire, having been a place of note in the 9th c., is surrounded by massive walls (with 21 towers), and has three cathedrals, 24 churches, and several monasteries, together with a diocesan seminary, a gymnasium, a military school for nobles, hospitals, &c. S. carries on manufactures of linens, soap, leather, and carpets, and a considerable export trade in corn and flax. Pop. 21,142. S. is historically notable as the scene of a bloody repulse of the Russians, under Barclay de Tolly and Prince Bagration, by Napoleon, August 17, 1812, when on his march for Moscow.

SMOLLETT, Tobias, an eminent British novelist, born in the year 1721, was descended from an old and distinguished family in Dumbartonshire. His grandfather, Sir James Smollett of Bonhill, was one of the commissaries or consistorial judges of Edinburgh, and sat in the Scots parliament as representative of his native county. Had the novelist survived about four more years than the term of his too short life, he would, as heir of entail, have succeeded to the ancestral estate in the beautiful vale of Leven. He lost his father while very young; but he was well educated, and afterwards apprenticed to a surgeon

in Glasgow. He is said to have wished to enter the army, and being disappointed, to have avenged himself on his grandfather, who thwarted his inclinations, by describing Sir James under the unamiable character of the old Judge in *Roderick Random*. This is related by Scott and all the biographers, but it must be wrong; for Sir James, the grandfather, died in 1731, when Tobias was only in his tenth year. The duty of attending to the education and settlement of the youth would naturally devolve on his widowed mother and on the Laird of Bonhill, his cousin. It is certain, however, that S. inherited no fortune; and in his 18th year, he went to London with a tragedy which he had written on the assassination of James I. of Scotland, and which he trusted would lead to distinction, if not wealth. He was grievously disappointed, and was glad to accept the post of surgeon's-mate on board one of the ships in the unfortunate expedition to Carthagena, in 1741. He soon quitted the service in disgust, although not before he had seen enough of naval life and character to be of inestimable value to him as a novelist; and returning to London, he commenced, and for the remainder of his life followed, the profession of an author. He made, indeed, repeated attempts to obtain practice as a physician, and in 1750, got a diploma of M.D. from Aberdeen; but his hasty irritable temper and independent spirit, joined to his natural propensity to satire, were fatal to his hopes. Even his literary career was a ceaseless warfare. In 1748, in his 27th year, he produced his *Roderick Random*, which was read with the utmost avidity, and seemed at once to place its author very near, if not in the actual rank of Fielding as a novelist. In 1751, appeared *Peregrine Pickle*, a more ambitious and not less successful work; and in 1753, *Ferdinand Count Fathom*, an inferior production, though containing scenes of striking adventure and eloquent description. S. next translated *Don Quixote* (1755), in which, it is admitted, he was surpassed by Motteux and Jarvis. He then undertook the editorship of a new Tory journal, *The Critical Review*, which was the most unfortunate of all his engagements, as it involved him in endless quarrels and personalities. For one article, an attack on Admiral Knowles, he suffered three months' imprisonment, and was fined £100. In 1758, he published his *History of England*, 4 vols. quarto—a history from the descent of Julius Cæsar to the treaty of Aix-la-Chapelle, in 1748, but which was begun and completed in 14 months, realising for its author a sum of £2000. Though superficial and inaccurate, this history has passages of fine animated writing and masterly delineation of character. We next find S. involved in political controversy with Wilkes and others, and defending Lord Bute's administration; but he wanted tact and temper for work of this description, and reaped no laurels as a politician. Another novel appeared in 1760—1761, *The Adventures of Sir Launcelot Greaves;* in 1766, two volumes of querulous *Travels in France and Italy;* in 1769, *The Adventures of an Atom*, a political satire unworthy of its author; and in 1771, only a few months before his death, *The Expedition of Humphry Clinker*, the best of all the novels of S.; and in the opinion of the late Mr Thackeray, one of the very best in the whole range of imaginative literature. Worn out with literary cares, private misfortunes, anxiety, and ill-health, the novelist retired to Italy, and died at Leghorn, October 21, 1771, in the 51st year of his age.

As a novelist, S. is distinguished by his broad humour and burlesque, the great variety of his incidents and characters, and the excellence of his easy, picturesque style of narrative. He is often careless, but rarely dull. He does not indulge in digressions, like Fielding, and though less of a literary artist than his great English rival, his works are read with more intense interest. He had, in fact, greater imagination and poetical sensibility. He added largely to our stock of original characters and humorists—Strap, Tom Bowling, Morgan the Welshman, Lismahago, and Matthew Bramble are still unsurpassed. Delicacy of taste was denied to both Fielding and S., and perhaps the latter is the more gross and sensual of the two. But the novelist lived in a coarse age, and possessed an exuberant fancy. There is a good deal to regret and to condemn; but to an author who has conferred so much true, healthy pleasure and enjoyment on countless generations of readers, forgiveness is easily extended, and is soon lost in admiration.

SMOLT. See SALMON.

SMORZATO, or **SMORZANDO** (Ital. dying away), a musical term, indicating a gradual diminution in tone, till the sound altogether fades away.

SMUGGLING is the offence of importing or exporting goods prohibited, or without paying the duties imposed on goods not prohibited. The offence in general leads to forfeiture of the goods. If goods are imported to defraud the revenue, treble value of the goods is forfeited. Many of the offences connected with smuggling are felonies, and punished with severity under the Customs' Consolidation Act. Where high protective tariffs separate the industry of adjoining countries, smugglers are certain to abound; no prohibitory decrees can keep the goods out. It was in vain that Napoleon fulminated the Berlin and Milan decrees for closing all continental ports against British shipping; British goods were landed at Salonica, passed on horseback through Hungary to Vienna, and thence distributed in all directions. Similarly, French manufactures reached England, often most circuitously: some a year in transit by way of Smyrna; others, *viâ* Archangel, after two years' journey. A vast cost was incurred in England in maintaining a Coast Guard and Preventive Service; but so long as smuggled goods could be sold at much lower prices than those at which they could be lawfully imported, so long would it be absolutely impossible wholly to suppress the traffic. The duties on French goods evaded in 1831, by the aid of smuggling, were estimated at £800,000. The true remedy for smuggling is a free, or, at least, very liberal tariff, without any prohibitive rates. Since the adoption of free trade by Great Britain, its Coast-guard has ceased to have any preventive duties to perform, and has been converted into the far better institution of a defence for the coasts from foreign foes, a reserve of trained men for the sea-service, and last, though far from least, a branch of skilful auxiliaries ready to aid any ship thrown in distress upon the British coast. The leading instances of smuggling still remaining are the execrable trade in slaves, and the great amount of contraband traffic from Gibraltar into Spain.

SMUT, the popular name of certain small fungi of the section *Coniomycetes*, and group or family *Uredineæ*, parasitical on plants, particularly on grasses, and notable for the great abundance of dark-coloured spores which they throw off. The name S., although somewhat variously used, is now very generally limited to the genus *Ustilago*, in which the character just mentioned, of the profusion of dark-coloured spores, is very remarkable. The name S. is often given to *Ustilago segetum*, or *Uredo segetum*, also called DUST-BRAND, a species very common and destructive, parasitic on wheat, barley, oats, and rye (see ERGOT), at the base of the germen and glumes, causing the death of the inner parts of

the flower, and then converting the whole into a sooty dusty mass. At first, a fine mycelium alone is seen, which ere long produces spores. There is no disagreeable smell, as in some of the allied fungi. A remarkable kind of S. infests maize, swelling the ears to an enormous size, sometimes even a foot in length. No remedy or preventive is known for smut. It does not seem to be communicated through infected grains; but perennial plants attacked by fungi of this kind remain diseased in subsequent years. Some kinds of S. attack other parts of plants than those chosen by *Ustilago segetum.* The reeds of the fenny districts of England are often much affected by a species (*Ustilago typhoides*), which much impairs their quality for all purposes, and has the more remarkable property of greatly affecting the health of the labourers employed in cutting and sorting them, producing not only a sense of oppression, but swelling of the head, the formation of vesicles, and inflammation of the bowels, besides other symptoms, such as are often produced by cantharides. Mr Berkeley says: 'The subject is worth attention, not only as curious in itself, but because it is very possible that, like the ergot, the fungus may afford a valuable addition to the Pharmacopœia.'

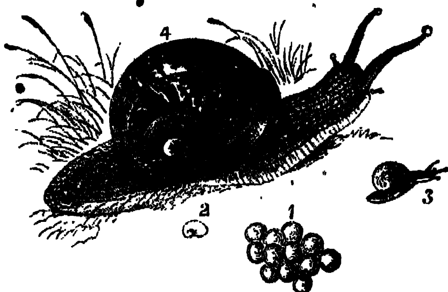
SMY'RNA, one of the most ancient and important cities of Asia Minor, and the only one of the Greek cities on the western coast which has retained its name and importance to the present day. The early history of S. is very obscure: varying accounts represent it either as originally an Ionian colony, or as having been at first an Æolian city, which, by an act of treachery, fell into the hands of Colophonian (Ionian) exiles, and subsequently, about 700 B.C., formed part of the great Ionian League. This earliest city of S., known among the Greeks as 'Old Smyrna,' was situated on the banks of the little river Meles, on the north-east side of the Hermæan Gulf, now the Gulf of Smyrna, and claimed the honour of being the birthplace of Homer; and here, near the source of the river, a grotto was shewn, in which he was said to have composed his poems. This old city of S. was destroyed, we are told, by the Lydian king Alyattes, and the place remained deserted and in ruins till after the Macedonian conquest, when the city was rebuilt at the distance of between two and three miles south of its original site. This city of 'New Smyrna' was founded by Antigonus, and enlarged and embellished by Lysimachus; it was laid out with great magnificence, and adorned with several fine buildings, among which was the *Homereum*, where the poet was worshipped as a hero. The city had an excellent harbour; and from its admirable situation, soon became one of the finest and most flourishing in the world. In the early history of Christianity, S. holds a distinguished place as one of the Seven Churches addressed in the Apocalypse, and as the scene of the labours and martyrdom of its first bishop, Polycarp. After various vicissitudes during the middle ages, it fell finally into the hands of the Turks, in whose possession it has since remained—the most flourishing city of the Levant.

The modern city of S. (Turkish *Izmir*) occupies the site of New S., being built partly on the plain at the head of the gulf, partly on the declivity of a hill, the ancient Mons Pagus, and, from the sea, has an attractive appearance. There are some good quays, and some handsome buildings of stone; but the greater part consists of low wooden houses, for the most part of one story high; and the streets, with a few exceptions, are ill-paved, narrow, crooked, and dirty. The city, however, in these respects is better than most other Turkish towns, and improvements have of late years been made. The pop. is estimated at 160,000; of whom 90,000 are Turks, 40,000 Greeks, 15,000 Jews, 10,000 Armenians, and 5000 Franks. As is usual in Turkish towns, each people has its separate quarter. S. contains several Greek, Armenian, Roman Catholic, and Protestant churches, and about 20 mosques. There are six journals published here in five different languages. The harbour is excellent; ships of large burden anchor close to the quays; and the trade is most important and extensive. A railway, 83 miles long, constructed mainly with English capital and by English engineers, is in progress to Aidin, an important inland commercial town, and 48 miles of it were in operation in 1863. Another railway, extending 58 miles inland (to Cassaba) was begun in 1864, and will be finished, it is expected, early in 1866. The chief imports are woollen, cotton, and silk fabrics, iron, tin, lead, and hardware goods, coffee to the amount of 6,000,000 lbs. annually, sugar, spirits, spices, indigo, cochineal, &c. The exports consist of wool, cotton, silk, carpets, hides, opium, madder, copper, valonia, olive-oil, drugs, and gums, figs, raisins, and many other articles. In 1864, 2556 vessels (of which 900 were British), of 892,156 tons, entered and cleared the port; and the imports for that year amounted to £3,730,523—the exports to £4,832,979. S. is regularly visited by the ships of the French, Austrian, and Russian Steam-navigation Companies, and by traders from Great Britain and other countries. It suffered severely from fire in the summers of 1841 and 1845, and has been often ravaged by earthquakes and the plague. The city and its territory are governed by a pasha. Of the ancient cities, not much remains. Some slight ruins mark the site of Old Smyrna. Of New S., some remnants of the massive walls on the hill south-east of the city are still to be seen; the site of the Stadium in which Polycarp is supposed to have suffered martyrdom, is pointed out; there are some fragments of the ancient theatre, and columns belonging to a temple; and numberless architectural fragments have been built into the walls of the Turkish town, or used in the construction of graves in the large Turkish cemetery.

SMYRNA, GULF OF, an inlet of the Ægean Sea, on the west coast of Asiatic Turkey, is so called from the city of Smyrna (q. v.), which stands at its head. It is 40 miles long, is about 20 miles in greatest breadth, and contains several islands. Its waters are deep, and it affords good anchorage.

SNAIL (*Helix*), a genus of gasteropodous molluscs of the family *Helicidæ*, having generally a subglobose, sometimes a depressed, spiral shell; the mouth of the shell more or less encroached upon by the last whorl but one, strengthened with an internal thickened rib, its edges more or less reflexed; the *foot* of the animal long, and pointed behind; the tentacles four, the lower pair much smaller than the upper; the tongue armed with many—often from 100 to 200—longitudinal rows of teeth. The species are very numerous, more than 1400 having been described; besides fossil species, of which also there are many. Some of the groups have been constituted into separate genera by recent authors, but all retain the popular name S., which is indeed often extended to all the *Helicidæ*. As an instance of the general distribution of snails, it may be noticed that *Helix aspersa*, one of the common garden-snails of Britain, is found very generally throughout Europe, great part of Asia and the north of Africa, and in South America.—Snails feed chiefly on vegetable substances, although they are very indiscriminate in their appetite, and even devour the dead of their own kind. The mischief which they

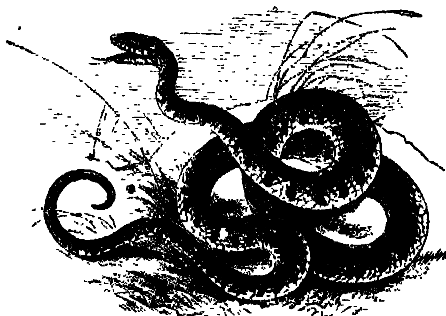
do to garden-crops is too well known; and gardeners lay down cabbage-leaves and the like to attract them, in order that they may be destroyed; any greasy substance increasing the attractiveness of the bait.—Snails delight in warm moist weather; in dry weather, their chief time of activity is during the night, and they hide themselves by day; but after rain, they come forth at any hour in



Common Snail and Eggs (*Helix aspersa*):
1, Eggs; 2, Appearance when newly hatched; 3, Slightly advanced stage; 4, Mature Snail.—Copied from Morton's *Cyclopædia of Agriculture*.

quest of food. At the approach of winter, or in very dry weather, they close the mouth of the shell with a membrane (*epiphragm*), formed by the drying of the mucous substance which they secrete, and become inactive and torpid. Some, as the Edible S. (*H. pomatia*), make a succession of such membranes; the outer one of which is also strengthened by a quantity of calcareous matter, the secretion being at first a white viscid fluid, but quickly hardening like plaster of Paris. When this is to be removed, a fresh secretion of fluid mucus softens it at the edges. Snails retreat into crevices for the winter, or into holes which they make in the earth, and which are roofed over with earth, dead leaves, &c., agglutinated by secreted mucus.—Snails are hermaphrodite, but mutual impregnation takes place, and when they are about to copulate, they excite each other by pricking or even piercing with a sharp calcareous glass-like style attached to a peculiar muscular sac which serves for its protrusion, and which is produced by recent secretion, not being found in them on dissection, except at the season of reproduction. Extraordinary as this circumstance is, it has been the subject of much exaggeration, and in works on natural history not of very old date, we read of snails throwing darts (*spicula amoris*) at each other, all which appears to be merely fabulous, although it is probable that the calcareous style may be often broken off in its use. The eggs of snails are round, and enveloped in a skin; they are generally deposited in little clusters. The eggs of the common garden-snails of Britain are about the size of peas, and are deposited just under the surface of the soil.—Snails possess in a very high degree the power of repairing injuries, not only of the shell—although the removal of the whole shell is fatal to them—but also of the soft parts. When the tentacles are cut off, they grow again; and even if the head is cut off, a new head is produced.—We do not think it necessary to describe any of the common British species, as there is nothing of peculiar interest connected with any of them; and the rarer and smaller species have still less claim to notice. The EDIBLE S. (*H. pomatia*) of the south of Europe is the only one that deserves to be particularly mentioned. It is found in the chalk and oolite districts of the south of England, where it is said to have been introduced from the continent in the 17th c.; but this is very doubtful. It has a shell about two inches in diameter and two inches in height, whitish or pale tawny, with four darker bands, often not very distinct. It was much esteemed as an article of food by the ancient Romans, who fattened their snails in enclosures (*cochlearia*) made for the purpose, feeding them delicately on meal and boiled wine. It is still in much esteem for the table in various parts of Europe, and is occasionally used in England. Nor is it the only species so used; the common garden-snails are probably equally good, although not so large, and 'the glassmen at Newcastle once a year have a snail-feast; they generally collect the snails themselves in the fields and hedges the Sunday before the feast-day.'—Turton's *British Land and Fresh-water Shells*. Snails of different species are also an article of exportation on a small scale from England to the United States, packed in old casks, in which they are conveyed very well, fixing themselves one upon another to the cask, and leaving a vacant space in the centre. Snails boiled in milk are popularly regarded as a remedy for diseases of the chest, and for this purpose they are brought to Covent Garden market. If any benefit results from the use of them, it is probably due to their nutritious qualities.—Some of the tropical species of Helix are very large, and some have very beautiful shells.

SNAKE, a term synonymous with serpent.—The name COMMON S. is very generally given in England to a species very abundant in most parts of that country, and throughout Europe from the south of Scandinavia to the Mediterranean, although there is only one doubtful instance of its having been found in Scotland. Its range extends also over great part of the north of Asia. This species (*Natrix torquata* or *Tropidonotus natrix*) is also known as the



Common, or Ringed Snake (*Natrix torquata*).

RINGED S. and the GRASS SNAKE. It belongs to the family *Colubridæ*, and to a section of it which some naturalists constitute into the family *Natricidæ*. It grows to the length of four and even five feet, although specimens exceeding three feet are rare. The female, as in serpents generally, is much larger than the male. The head is ovate, the muzzle rather narrow, the back part considerably broader than the neck; the body thickens towards the middle, and again tapers towards the tail, which is about one-fifth of the entire length, tapering to a rather sharp point; the gape is wide; the upper part of the head covered with large plates; the scales of the back have an elevated keel; those of the sides are larger, the keel merely rudimentary; the belly is covered with broad oblong plates; the under part of the tail has plates arranged in two rows. The teeth are very small, directed backwards, and arranged in two rows on each side of the jaws. The upper parts are grayish brown, tinged with green;

at the back of the head are two crescent-shaped bright yellow spots, forming a kind of ring or collar; immediately behind these are two broad black spots, sometimes confluent. Two rows of small black spots are arranged alternately down the back, and larger ones at the sides; but these vary much in size and other particulars. The belly is pale lead colour, often marbled with black. The outer skin is changed at intervals varying according to the weather and other circumstances. Mr Bell says: 'I have known the skin shed four or five times during the year. It is always thrown off by reversing it; so that the transparent covering of the eyes, and that of the scales also, are always found concave in the exuviæ. Previously to this curious circumstance taking place, the whole cuticle becomes somewhat opaque, the eyes are dim, and the animal is evidently blind. It also becomes more or less inactive, until at length, when the skin is ready to be removed, being everywhere detached, and the new skin perfectly hard underneath, the animal bursts it at the neck, and creeping through some dense herbage, or low brushwood, leaves it attached, and comes forth in far brighter and clearer colours than before.' This snake is partial to damp situations, and often enters water, in which it swims with great ease, moving with singular gracefulness. It sometimes remains at the bottom for a considerable time. It sometimes climbs trees, its body, when ascending the stem, being 'straight and rigid as a stick.' See SERPENTS. It is very voracious; its food consists of frogs, small birds and quadrupeds, &c. Its teeth being incapable of tearing, cutting, or masticating food, the prey is always swallowed entire and living. Mr Bell heard a frog emit a cry some minutes after it had been swallowed by a snake. The S. has no poison-fangs. It has another kind of defensive armour, in certain glands, which emit a volatile substance of most offensive and penetrating odour, which, like that of the skunk, can hardly be removed from the skin or clothes. No such odour is emitted except in moments of irritation or other passion. The Common S. is oviparous: its eggs—usually about fifteen or twenty in number, whitish, with a parchment-like skin, and united into a string by a glutinous substance—are deposited in moist and warm situations, often in dunghills. The mother is said sometimes to coil herself around them, but generally leaves them unregarded. This snake is capable of being tamed, and becomes familiar with those who are kind to it, whilst the approach of a stranger, or of a dog or cat, alarms it, and causes an emission of stench. In winter, it seeks some refuge from severe cold, and becomes lethargic or dormant. Large numbers of snakes often take refuge in one hole; but seldom so many as in an instance recorded by Dr Carpenter, in which about 1300 were found in an old lime-kiln.

Much interest was excited in 1862 by the discovery in England of a species of snake, *Coronella lævis* (see CORONELLA and SERPENTS), previously unobserved in Britain, but common in the middle and south of Europe, and sometimes distinguished by the name of AUSTRIAN S., sometimes by that of SMOOTH S., none of the scales being ridged or keeled, as in the Common Snake. It inhabits much drier situations than those affected by the Common S., where it is often found in company with the Sand Lizard, situations more resembling those in which the viper is found. This snake is also more similar to the viper in form and appearance than the Common S., and these circumstances have probably led to its being often mistaken for the viper, and its existence in England remaining unnoticed so long. It attains a length of about two feet; is of a shining brown colour, ornamented with checkered irregular patches of black; a yellow mark on the back and sides of the head; the lower parts yellowish, with square black spots. The head is not flattened, as in the viper, but is narrowed in a similar way towards the neck; there is much difference in the plates of the head; the yellow mark on the head is a very characteristic distinction, and the back does not exhibit a broad zigzag pattern, as in the viper. Unlike the Common S., the *Coronella lævis* is ovoviviparous, the eggs being hatched within the mother. For an illustration of the *Coronella lævis*, see SERPENTS.

SNAKE-BIRD. See DARTER.

SNAKE-EEL, the popular name of the fishes forming the family *Ophisuridæ* of some naturalists, included by others, with all the eels, in the family *Murænidæ*, and distinguished by the want of a tail-fin, and the tail ending in a conical point like that of a serpent. They are inhabitants of the seas of warm climates. One species, *Ophisurus serpens*, is found in the Mediterranean. It attains the length of about six feet, and the thickness of a man's arm; is brown above, silvery beneath, and has a slender and pointed snout.

SNAKE RIVER, also called LEWIS' FORK, is the great southern branch of the Columbia (q. v.).

SNAKE-ROOT. See POLYGALA and ARISTOLOCHIA.

SNAKE-STONES, small rounded pieces of stone or other hard substance, popularly believed to be efficacious in curing snake-bites. A belief in their efficacy has been long and very widely diffused, and probably extended to Britain and other western parts of the world from the East. Small perforated balls and rings of various kinds of stone, ivory, &c., strung together like beads, were formerly used as snake-stones in Scotland, being given to cattle to chew when they were bitten by vipers. Of course they could only be expected to act as a kind of charm. Many of the snake-stones used in India and the further east seem to be of no greater value. Some of them, however, appear to be really efficacious, being applied to the wound and absorbing blood from it with the poison before it has entered the system. Remarkable instances are related of speedy cures thus effected. The snake-stone adheres for a short time to the wound, and then falls off. The wounded limb is meanwhile rubbed downwards. Two small snake-stones, each the size of a large pea, brought from India, and which were known to have cured a man bitten by a cobra, were found by Mr Quekett to be composed of some vegetable matter. Another, also known to have cured a cobra's bite, having been brought from Ceylon by Sir James E. Tennent, was examined by Mr Faraday, and was deemed by him to be 'a piece of charred bone, which has been filled with blood, perhaps several times, and then carefully charred again.'—See Buckland's *Curiosities of Natural History*, and Tennent's *Ceylon*, vol. i.

SNAKE-WEED, another name of BISTORT (q. v.).

SNAKE-WOOD, another name of LETTER-WOOD (q. v.).

SNAPDRAGON (*Antirrhinum*), a genus of plants of the natural order *Scrophulariaceæ*, consisting of annual and perennial herbaceous plants, chiefly natives of the temperate parts of the northern hemisphere. They have the calyx 5-parted; the corolla swollen at the base, but without a spur, and *personate* (Lat. *persona*, a mask), i. e., its mouth closed by the pressure of the lower against the upper lip; and the fruit is a 2-celled oblique capsule, opening by three pores at the apex. The

English name refers to a peculiarity of the corolla, the lower lip of which, if forcibly parted from the upper, so as to open the mouth, shuts with an elastic



Snapdragon (*Antirrhinum majus*).

spring or snap. Some of the species have very pretty flowers. *A. majus* has long been a favourite in our gardens, in which there are many fine varieties of it.

SNAPHAUNCE, an old musket of the 17th and first half of the 18th c., called also Asnaphan. See Lock.

SNEE'HÄTTEN. See Norway.

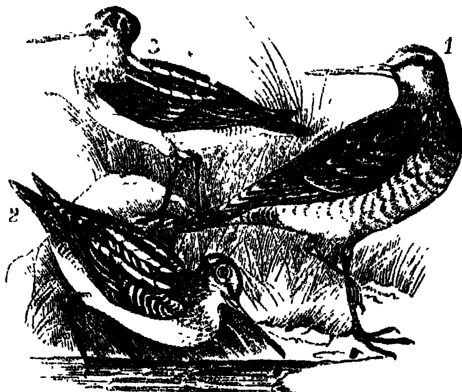
SNEEK, a prosperous trading and manufacturing town in the Netherlands, province of Friesland, 13 miles south-south-west of Leeuwarden. It is built in the form of an irregular triangle, has three canals, and good water-way to the sea. Rich meadow-lands, in some places tending to be marshy, surround the town, and in the neighbourhood is a considerable lake called the Sneekermeer. Pop. (1864) 8862, 1412 being Roman Catholics, the remainder, except 144 Jews, Protestants. S. is the largest butter and cheese market in the province; in 1863, the quantity sold reaching 4,887,025 lbs. of butter, and 2,001,828 lbs. of cheese. The principal buildings are the Reformed Church, Town-house, Baptist Church, and Jewish synagogue.

SNEEZE-WOOD (*Ptæroxylon utile*), a tree of the natural order *Sapindaceæ*, a native of South Africa, common in the eastern districts of Cape Colony. The timber rivals mahogany in beauty, takes a fine polish, is very solid, strong, and durable. It receives its English name, and its Dutch name, *Nieshout*, from the sternutatory properties of its sawdust, by which workmen are often much annoyed.

SNELL EXHIBITIONS. These exhibitions were founded in the year 1677 by John Snell of Uffeton, in the county of Warwick, for the purpose of educating Scottish students at the university of Oxford. Snell was born in the parish of Colmonell, in Ayrshire, in 1629, and entered the university of Glasgow in 1644. He afterwards removed to England, where, after holding several offices of a legal nature, he was appointed seal-bearer to the Court of Chancery. He died at Holywell, near Oxford, in 1679, leaving his estate of Uffeton, near Leamington, to trustees (the Vice-chancellor of the university of Oxford, the Provost of Queen's College, the Master of Balliol College, and the President of St John's College), for the foundation of the ten scholarships which now bear his name. The exhibitions have been the subject of much litigation in the court of Chancery, and are now administered under a scheme settled in 1861. The exhibitioners are nominated by the college of Glasgow, and receive about £108 annually each during five years. Candidates for these scholarships must have been born in Scotland, or must be sons of fathers born in Scotland, and must have resided for two years at least in Glasgow College, or for one year in that college, and two at least in some other college in Scotland. None are admitted to examination who have completed their 21st year, or have been members of the university of Oxford of more than two years' standing from the day of their matriculation inclusive. Two exhibitioners are nominated annually after public competition. The list of Snell exhibitioners includes not a few well-known names, such as J. G. Lockhart, Sir W. Hamilton, the present Bishop of London (Tait), &c.

SNIA'TYN, a town of Galicia, in Austrian Poland, is situated on the Pruth, and was formerly a frontier stronghold. It has tanneries, and a considerable trade in cattle and horses. Pop. 10,000, among whom are many members of the Armenian Church.

SNIPE (*Scolopax*), a genus of birds of the family *Scolopacidæ* (q. v.), having a very long straight bill, with nasal grooves extending almost to the tip, which expands a little, the upper mandible slightly exceeding the lower in length, the whole bill soft and very sensitive, smooth and shining in the living bird, but soon after death becoming pitted like the end of a thimble by drying. The head is compressed; the eyes large, and placed far back in the head, an evident adaptation to the mode of life, enabling the bird to guard against danger, whilst its bill is plunged in the mud. The feet have three toes before, divided to the base or very nearly so, not edged by membrane, the hind-toe short. The tail is short. The genus naturally divides itself into two sections, sometimes regarded as distinct genera, the first consisting of the Woodcocks (q. v.), to which the generic name *Scolopax* is appropriated; the second containing the species popularly known as Snipes, which receive the generic name *Gallinago*,



1, Solitary Snipe (*Gallinago major*); 2, Common Snipe (*Gallinago media*); 3, Jack Snipe (*Gallinago gallinula*).

and are distinguished by their lighter form, by their longer legs, and by having a little of the lower part of the tibia bare.—The Common S. (*S. gallinago*, or *Gallinago media*) is about 11 inches in entire length, the bill almost 3 inches. The sexes are alike in plumage, but the female is rather larger than the

male. The general colour of the upper parts is blackish brown, finely mixed with pale brown and with a rich buff colour; three pale brown streaks along the head; the neck and breast pale rust colour mottled with black; the belly white. The tail consists of 14 feathers. The S., when flushed, changes its course several times in a zigzag manner in the air, and then darts off very swiftly, so that young sportsmen find it a very difficult bird to shoot. The S. makes a very inartificial nest of a little dry herbage, in a depression of the ground, or sometimes in a tuft of grass or rushes. The eggs are four in number, pale yellowish or greenish white, the larger end spotted with brown. This species of S. is plentiful in all the moory and marshy parts of Britain, and generally throughout Europe, also in some parts of Asia, and it is found in the north of Africa. It breeds in Britain, even in the south of England, although many of the snipes which spend the winter in Britain migrate northwards in spring. The S. is capable of being tamed, and becomes very familiar, but is difficult to keep from the prodigious quantity of worms and other such food which it requires. A tame S. has been known to eat nearly twice its own weight of worms in 12 hours. The S. is in high esteem for the table, and is included amongst game in Britain.—The habits of all the other species of S. correspond very nearly with those of the Common Snipe. The GREAT S., or SOLITARY S. (*S.* or *G. major*), is comparatively a rare bird in Britain, but abounds in the extensive marshes of continental Europe, and is found also in Asia. Its entire length is about 12½ inches, the bill not quite so long in proportion as that of the Common Snipe. There are 16 feathers in the tail.—The JACK S., or JUDCOCK (*S.* or *G. gallinula*), the smallest of the British species, is like the Common S. in plumage. It is common in Britain, but mostly as a winter visitant, and is found also, during summer or winter, in most parts of Europe and of the north of Asia.—North America has a number of species. The COMMON AMERICAN S. (*S.* or *G. Wilsoni*) is about equal in size to the Common S. of Europe, and much resembles it also in plumage. The tail has 16 feathers. This species is abundant in summer in the northern parts of the United States and in Canada, in the more southern states in winter. It is in much request for the table, and is often caught in snares.—Snipes are found also in other parts of the world. The name S. is extended in popular usage to include the genus *Macrorhamphus*, in which the outer toes are connected at the base by a membrane. In other characters, as well as in plumage and habits, the similarity to the true snipes is very great. The RED-BREASTED S., or BROWN S. (*M. griseus*), of North America has been occasionally seen in Britain and in Scandinavia. In size it is nearly equal to the Common Snipe.

SNIPE-FISH. See TRUMPET-FISH.

SNI'ZORT, LOCH, a large and picturesque inlet of the sea, in the north-west of Skye (q. v.), between Trotternish Point and Vaternish Point. At its head, the loch is only a few furlongs broad; but it gradually expands, and at its entrance the breadth is over 7 miles. It is 13 miles long.

SNORRI STURLESSON, a learned historian, and a distinguished Icelandic politician, was born in 1178 at Hvamma, in Iceland, where his family, who traced their descent to the ancient kings of Norway and Sweden, had been settled since the early colonisation of the island. S. S. was placed at an early age under the care of Jon Loptson, the grandson of Sæmund Sigfusson, the learned compiler of the old Edda, by whom he was instructed in the history, mythology, and poetry of the North, as well as in classical literature. By his marriage, at the age of 26, with a rich heiress, and the speedy death of his father, S. S. early attained a position of wealth and influence, and by the free choice of the people, was elected supreme judge, or chief magistrate of the island. In this post, he was distinguished for his profound knowledge of the laws and civil institutions of his native country; but his ambition, avarice, and love of intrigue embroiled him personally in sanguinary feuds, and contributed to hasten the destruction of Icelandic independence. His love of intrigue led him to take part in the intestine troubles of Norway, and thus drew upon him the suspicion and ill-will of the Norwegian king, Hakon, who sent secret instructions to Iceland for his arrest; or, if need be, his assassination. The king's intentions were carried out to their fullest extent; and his numerous enemies joining together in a plot against him, S. S. was attacked in his own house, and murdered in the year 1241. S. S. was a poet of no mean order, and composed numerous *drapas*, or laudatory poems, on the kings and jarls at whose courts he sojourned. His great work is the *Heimskringla*, or Mythic Ring of the World, in which he records the history of the kings of Norway from the earliest times to the death of Magnus Erlingsson, in 1177; and which he compiled from ancient genealogical tables and other documents. It was translated into Danish about 1559 by Peder Clauson, and published first by Olaf Worm (Cop. 1633). This translation has been republished in more recent times by Gruntvig (3 vols., Cop. 1818—1822) and others. German, Swedish, and Latin versions have also been executed. S. S. is believed to have had a share in collecting and arranging the songs of the elder or poetic Edda (q. v.), and to have contributed very materially towards the compilation of the Skalda and other parts of the younger or prose Edda.

SNOW is the frozen moisture which falls from the atmosphere when the temperature is 32° or lower. It is composed of crystals, usually in the form of six-pointed stars, of which about 1000 different kinds have been already observed, and many of them figured, by Scoresby, Glaisher, and others. These numerous forms have been reduced to the following five principal varieties—1. Thin plates, the most numerous class, containing several hundred forms of the rarest and most exquisite beauty (figs. 1 to 6). 2. A spherical nucleus or

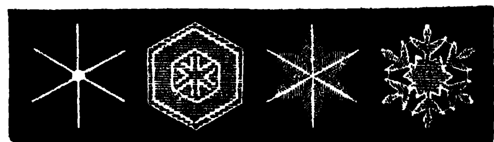


Fig. 1. Fig. 2. Fig. 3. Fig. 4.

plane figure studded with needle-shaped crystals (fig. 8). 3. Six or more rarely three sided prismatic crystals. 4. Pyramids of six sides (fig. 9). 5. Prismatic crystals, having at the ends and middle thin plates perpendicular to their length (fig. 7). The forms of the crystals in the same fall of snow are generally similar to each other. The crystals of hoar-frost being formed on leaves and other bodies disturbing the temperature, are often irregular and opaque; and it has been observed that each tree or shrub has its own peculiar crystals. Snow-flakes vary from an inch to $\frac{1}{100}$ths of an inch in diameter, the largest occurring when the temperature is near 32°, and the smallest at very low temperatures. As air has a

smaller capacity for retaining its vapour as the temperature sinks, it follows that the aqueous precipitation, snow or rain, is much less in polar

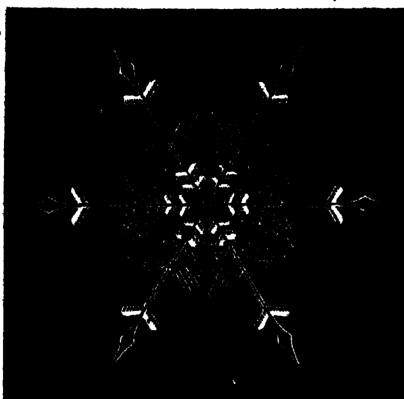


Fig. 5.

than in temperate regions. The white colour of snow is the result of the combination of the different prismatic rays issuing from the *minute* snow-crystals. Pounded glass and foam are analogous cases of the prismatic colours blending together

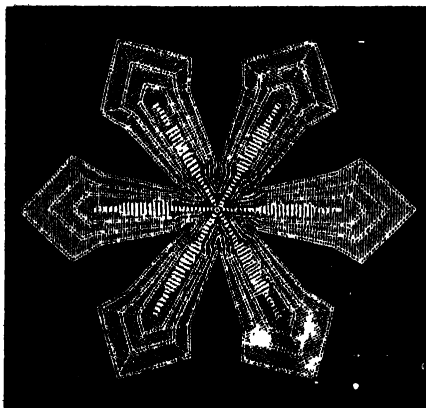


Fig. 6.

and forming the white light out of which they had been originally formed. It may be added that the air contained in the crystals intensifies the whiteness of the snow. See RED SNOW. The limit of the fall of snow coincides nearly with 30° N. lat.,

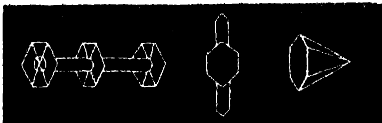


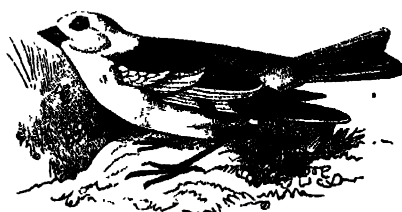
Fig. 7. Fig. 8. Fig. 9.

which includes nearly the whole of Europe; on traversing the Atlantic, it rises to 45°, but on nearing America descends to near Charleston; rises on the west of America to 47°, and again falls to 40° in the Pacific. It corresponds nearly with the winter isothermal of 52° Fah. Snow is unknown at Gibraltar; at Paris, it falls 12 days on an average annually, and at St Petersburg 170 days. It is from 10 to 12 times lighter than an equal bulk of water. From its loose texture, and its containing about 10 times its bulk of air, it is a very bad conductor of heat, and thus forms an admirable covering for the earth from the effects of radiation—it not unfrequently happening, in times of great cold, that the soil is 40° warmer than the surface of the overlying snow. The flooding of rivers from the melting of the snow on mountains in summer, carries fertility into regions which would otherwise remain barren wastes.

SNOW-BALL TREE. See GUELDER ROSE.

SNOWBERRY (*Symphoricarpos* or *Symphoria racemosa*), a bushy deciduous shrub of the natural order *Caprifoliaceæ*, a native of the northern parts of North America, and now very common in British shrubberies. It has simple leaves and small flowers; berries about the size of black currants, remaining on the bush after the leaves, quite white, but uneatable.—The name SNOWBERRY is also given to *Gaultheria serpyllifolia*, a native of the bogs of North America.

SNOW BUNTING, or SNOWFLECK (*Plectrophanes nivalis*), a bird of the Bunting family



Snow Bunting (*Plectrophanes nivalis*).

(*Emberizidæ*), of a genus distinguished from the true buntings by the long and nearly straight claw of the hind-toe, in this resembling the larks. There is also an approach to larks in habits; there is a similar ease and celerity in running along the ground, and the song is very different from that of any of the true buntings. The S. B. abounds in summer in all parts of the arctic regions, and in winter in more southern countries of Europe, Asia, and America. Linnæus says it is the only living creature that has been seen 2000 feet above the limits of perpetual snow on the mountains of Lapland. Great flocks are seen in Britain, particularly in severe winters, generally frequenting uplands in mild weather, but descending to the low grounds and seashore in hard frosts. Comparatively few visit the south of England. A few remain during summer on the highest mountains of Scotland. The nest is placed on the ground, or in a crevice of a rock. The S. B. is generally very fat, and is highly esteemed for the table. The Greenlanders kill great numbers, and dry them for winter use.

SNOW'DON, a mountain-range in Caernarvonshire, North Wales, stretches in a north-east-by-north direction from a point 5 miles north of Cricceith, near the head of Cardigan Bay, to near Conway; but is broken up by valleys and river-courses into four mountain groups, whose chief peaks are Carnedd-Llewelyn, 3460 feet; Moel-Siabod, 2878 feet; and *Moel-y-Wyddfa* ('the Conspicuous Peak'), the highest mountain in South Britain, 3571 feet above sea-level. Seen from the top, Moel-y-Wyddfa, the 'King of Snowdonia,' appears to send out three ridges, which gradually divide and subdivide, giving birth to numerous valleys and corries. The ascent of the highest peak of S. is effected by tourists from Llanberis (on the north), Beddgelert (on the south), Llyn-Cwellyn (on the

west), and Capel Curig (on the east); the first is shortest and easiest; the last is longest, most difficult, but at the same time by far the grandest. The district of 'Snowdonia' was made a royal forest by Edward I. of England, but was disafforested in 1649.

SNOWDROP (*Galanthus*), a genus of plants of the natural order *Amaryllideæ*, of the same tribe with Amaryllis, Snowflake, Crinum, &c. The three outer segments of the perianth spread, so as to make a bell-shaped flower; the three inner are shorter, erect, and notched at the summit. The flowers arise from a spathe. The root is bulbous, and produces two leaves and one single-flowered leafless stem (*scape*). The Common S. (*G. nivalis*),



Common Snowdrop (*Galanthus nivalis*).

a plant too well known to need description, is a native chiefly of the south of Europe, growing in woods and pastures. It is found apparently wild in some places both in England and Scotland, but is probably rather naturalised than native, having long been much cultivated in gardens. Another species of S. (*G. plicatus*), with much broader leaves, is found in the south of Russia and in Asiatic Turkey.

SNOW-LINE. The snow-line marks that height above the sea-level below which all the snow that falls annually melts during summer; higher than this lies the region of perpetual snow. No general rule for the height of this line can be given, owing to the different causes which may determine it. These are—the situation of the slope in respect of the sun's rays, and hence, other things being equal, it is higher on the south than on the north side of mountains; the situation with respect to the rain-bringing winds; the steepness of the slope; and the dryness or humidity of the region. The following are the observed heights of the snow-line in English feet, in different parts of the globe:

	N. Lat.	Height.
Spitzbergen,	78	0
Sulitelma, Lapland,	67	3,835
Kamtchatka,	59½	5,249
Unalaschta, W. America,	56½	3,510
Altai,	50	7,034
Alps,	46	8,885
Caucasus,	43	11,063
Pyrenees,	42¾	8,950
Rocky Mountains,	43	12,467
North Himalaya,	29	19,560
South Himalaya,	28	15,500
Mountains of Abyssinia,	13	14,065
Purace,	2¼	15,381
	S. Lat.	**Height.**
Nevados of Quito,	0	15,820
Arequipa, Bolivia,	16	17,717
Paachata, Bolivia,	18	20,079
Portillo, Chili,	33	1,473
Cordilleras, Chili,	42½	6,010
Magellan Strait,	53½	3,707

From lat. 0° to 20°, it sinks only a very little; from 20° to 70°, it continues to fall equably; but from 70° to 78°, it sinks with great rapidity. To this general statement there are some important exceptions. It is about 4000 feet higher on the north than it is on the south side of the Himalaya, owing to the greater depth of snow that falls on the south side; to the greater dryness of the climate of Tibet, which increases the evaporation and the heating power of the sun's rays; and to the naked rocks and soil of the north absorbing more heat than surfaces covered with vegetation. It is higher in the centre of continents than near the coasts (the rain being less, and the heat greater), as seen on comparing the Pyrenees and Caucasus; and on the east than on the west coasts of continents, which is strikingly illustrated by Kamtchatka (5249) and Unalaschta (3510), situated respectively on the west and east coasts of the North Pacific. South of the equator, it rises from 0° to 18° very considerably, and more so on the west than on the east of the Cordilleras, owing to the small amount of rain and snow which falls on the west of these mountains. It is as high in 33° south lat. as in 19° north lat.; but south of this it sinks very rapidly, so that in the south of Chili it is 6000 feet lower than in the same latitude in the Rocky Mountains, and 3000 lower than in Western Europe. The mean temperature of the snow-line varies much from the equator to the pole—from 35° to 20° Fah. In the Alps, it is about 25°; and in Norway, about 23°.

SNOW-SHOES, a species of shoe much used by the Esquimaux, Laplanders, and others who inhabit those regions where snow prevails for a great portion of the year. It consists of a flat frame, of a lanceolate form (see fig.), from 8 to 14 inches in breadth at its widest part, and of great length—sometimes as much as 7, though generally about 4 feet. It is either wholly of wood, or is a wooden frame filled in with wicker-work or thongs, and has cross-straps on the upper surface to attach it to the foot. The broad surface prevents the foot from sinking in the snow.



Snow-shoe.

SNUFF. See TOBACCO.

SNYDERS, or SNEYDERS, FRANÇOIS, a Belgian artist, celebrated for his powers as an animal-painter, was born at Antwerp in 1579, and was formed in the school of Henry van Baelen. Originally, he confined himself exclusively to painting fruits, and worked with Rubens. In his pictures, with figures by Rubens, Jordaens, Honthorst, and Mierevelt, it is difficult to discover any difference of touch. For Philip III. of Spain he executed several hunting and battle pieces. S. knew how to give expression to the passions of the lower creation, and his bear, wolf, and boar fights are scarcely surpassable. The best specimens of the artist are contained in the galleries of Vienna, Munich, and Dresden, but there are also some fine pictures of his in private English collections. S. died at Antwerp in 1657.

SOAP (Lat. *sapo(n)*, Welsh *sebon*—the Romans considered soap to be a Celtic invention). This well-known material, according to Pliny, first became known to the Romans by their conquest of Gaul. There are some notices of it in the English version of the Bible, but it is believed that the words *borith* and *nether*, there rendered into soap, really mean potash and soda.

The *chemical composition* of soap may be explained as follows: The fixed fatty bodies, stearine, palmitine, and oleine (we do not include margarine, for it is now generally admitted that the fat to which this name was applied is merely a mixture of stearine and palmitine), when heated with alkaline solutions, undergo the remarkable change known under the title *Saponification*, or conversion into soap, during which process the fats yield up a clear viscid liquid, which, from its sweetness, is termed *Glycerine* (q. v.). The nature of this change may be ascertained by decomposing the soap that is thus formed, and which exists as a homogeneous transparent mass, freely soluble in warm water, by the addition of some acid, such as tartaric or hydrochloric, which combines with the alkali, and forms a soluble compound with it. A fatty matter separates in flakes, which melt on the application of heat, and form an oily layer on the surface of the fluid. This substance, when cold, is found to be very different from the original fat. It has acquired a strongly acid reaction, as may be ascertained by applying test-paper to it in its melted state, and it is freely soluble in alcohol, the solution being strongly acid. It at once forms a clear solution in hot alkaline liquids, while the original fat would under similar conditions have formed a milky-looking fluid. It is, in fact, a true *acid*, capable of forming salts, the potash and soda salts being known as *soft-soap* and *hard-soap*, which have been thus generated out of the elements of the neutral fat under the influence of the alkali. Stearine, when thus treated, yields *Stearic Acid* (q. v.); palmitine yields *Palmitic Acid* (q. v.); and oleine, *Oleic Acid* (q. v.); while common fat, which is a mixture of the three above-named fats, affords, on saponification with an alkali, and subsequent decomposition of the soap, a mixture of the three fatty acids. It is found that the weight of these acids and of the glycerine always exceeds by about 4 per cent. that of the fat originally employed. This may be explained by the fact, that each fat is a compound of a fatty acid with the base of glycerine, which has been displaced by the alkali in the act of saponification. The hydrated alkali, in displacing the glycerine base, gives up a portion of water to it, and thus increases its weight; while the fatty acid, on being separated from the soap in like manner combines with a portion of water.

The term soap is sometimes extended in meaning, so as to include compounds of the fatty acids with other bases besides the alkalies, e. g., lime, baryta, magnesia, &c.; but these compounds being insoluble are inapplicable to the purpose of cleaning. The true soaps owe their cleaning power to their solubility, and their attraction for the matters that ordinarily constitute 'dirtiness.' The presence of a portion of free alkali increases the detergent power, especially in the case of greasy matter.

Manufacture.—It is found in practice, that generally all such fats and oils as soon become rancid—that is, naturally decompose, and liberate their acids—are the most economical for soap-making. Besides the oils, fats, and alkalies, resin (q. v.) is used in order to economise the more expensive alkalies; a small portion of lime, dissolved by the water in the first stage of the process, also enters into the composition of soap. The chief oils or fats used in soap-making are tallow and grease, palm oil, cocoa-nut oil, and olive oil for hard-soaps; and linseed and hempseed oils for soft-soaps. The first stage in the manufacture of common soap is to produce a caustic alkaline *lye:* this is done in iron tanks, usually six feet in width, and four feet in depth, with a plug-hole at the bottom; sometimes they have a perforated false-bottom inside, which is converted into a filter by covering it with a piece of coarse canvas. In these tanks, alternate layers of soda-ash and quicklime are laid in regular proportions—the function of the lime being to deprive the carbonate of soda of its carbonic acid —and water is let in slowly, until the tanks are full. In this state they are left for nearly a whole day, when the plugs are withdrawn, and the liquid is received into a vessel placed below. The plugs are then replaced, and the tanks refilled with water, which, after remaining a sufficient time, is in the same way drawn off into another vessel. This is repeated as long as any alkali remains to be dissolved. Each drawing-off is kept by itself, and they are called *first-running*, *second-running*, and so on. The next step is to pump about 200 gallons of the weakest, which should contain not less than two per cent. of pure alkali, into the copper, which is an iron basin of large size; a ton of fat is added, and heat sufficient to boil gently is applied for about four hours. The fire being then allowed to go out, the lye is found to have lost its alkali, and in an hour or two settles down at the bottom of the copper, from which it is withdrawn, leaving the now partially saponified fat behind. To this is then added another portion of lye of the running next in strength to that used, and a fresh quantity of fat is also added; the boiling operation is repeated, and afterwards the spent lye is withdrawn. This process is repeated until all the lyes from the weakest to the strongest have been used. These successive operations usually occupy five or six days, by which time the whole quantity is completely converted into soap, a result which is known by various tests to the experienced workman.

But although the saponification has thus been effected, the material is not in a state fit for use; it has therefore to be reboiled with a quantity of water or very weak lye, until it is so diluted that its particles seem to be separating from each other; then the boiling is carried on with great vigour; and to prevent its boiling over, the men keep shovelling back the lye from the breast of the boiler, so as to break up the froth, and promote the evaporation of the water. After a time, the soapy particles distributed through the fluid begin to cohere until they are all united again in one pasty mass, resting on the top of the water; the cover is then put on the top of the copper, and the fire withdrawn, and the whole left standing for about three days, when the lid is lifted, and the soap is carefully removed from the top of the spent lye or water by means of ladles, which transfer it to wooden or iron tanks, made up of a number of frames of regular size, placed upon one another; each the thickness of a bar of soap. When the soap has *set*, a piece of wire is drawn successively between each two frames, and they are thus cut asunder with the soap they enclose. They are then set on their sides for a short time, and the soap becoming drier, is easily detached in the form of square cakes of uniform thickness. These cakes are then cut by wire transversely, so as to form the square *bars* of commerce.

To manufacture soap successfully requires much skill, for the materials are rarely of exactly the same qualities; the process cannot be reduced to the nice exactness of other chemical manipulations, therefore much depends upon the eye and the experience of those employed. If soaps become tinged with the iron of the boiler in which they are made, as they usually do, and contain too little water to render them sufficiently fluid to deposit these stained portions, the soap is then mottled, and these *mottled soaps* became favourites, because they were less mixed with water; but this distinction is

not now of much value, for they are successfully imitated. The Castile or olive-oil soaps of Spain are amongst the best. The palm-oil and resin soap, so largely manufactured in Britain, is the cheapest and best fitted for common use. Perfumed soaps are only used for the toilet, and are very various, according to the odour employed, and the artificial colours imparted to them. *Marine-soap* is made of cocoa-nut oil, soda, and water, and has the remarkable property of dissolving as well in salt water as in fresh, hence it is much used at sea for washing.

Soft-soap is comparatively little used, except for coarse purposes, in Britain; but in the northern parts of the continent, especially in Holland, it is chiefly used for washing linen, &c.

Several vegetables contain a principle called *saponin*, which is remarkably analogous to soap in its action, hence they are in different parts of the world used for washing clothing, &c. See SOAPWORT.

SOAP, MEDICAL USES OF. The only kind of soap that should be used internally is *White Soda Soap.* It is prepared from caustic soda, and either olive or almond oil. In its purest state, it is called *Medicinal Soap*, while in its less pure forms it is known as Alicant, Venice, or Spanish soap. When properly made, it should be perfectly soluble in pure water and in alcohol. It is chiefly employed to form pills of a gently aperient and antacid action. Pills containing a combination of soap and dried carbonate of soda, are of great use in certain forms of gravel. Soap is often added to pills as an adjuvant, or for the purpose of preventing them from becoming hard and insoluble. White soap affords a ready antidote in cases of poisoning with the strong mineral acids. *Soft-soap* ought to be made with olive oil and potash, and it should be of yellowish-white colour, inodorous, and of the consistence of thick honey.' It is of great service, as an external application, either alone or in association with sulphuret of potash, and other remedies, in various cutaneous affections.

SOAPBERRY (*Sapindus saponaria*), a West Indian tree, of the natural order *Sapindaceæ*, the pulp of the fruit of which is used instead of soap in washing. This property belongs to other species of the same genus. With the exception of *S. marginatus*, found in the southern states of North America, the genus is entirely tropical. The use of the pulp as soap, if often repeated, is apt to injure linen; but it is capable of cleansing as much linen as sixty times its weight of soap. Each fruit contains a nut of a shining black colour. These nuts are very hard, and were formerly imported into Europe to be made into waistcoat buttons, being tipped with silver or other metal. They were little liable either to be injured by wearing or to be broken.

SOAP-STONE. See STEATITE.

SOAP-TEST. This test, for which science is indebted to Professor Clark of Aberdeen, is now universally employed for determining the degree of hardness of water. Every one knows how much more readily a lather is formed—as, for example, in washing the hands—with soft than with hard water. This is accounted for by the earthy bases of the hard water displacing the alkaline bases of the soap, and forming compounds insoluble in water. This is the foundation of the soap-test. A hard water of known strength is first prepared by dissolving 16 grains of pure carbonate of lime in pure hydrochloric acid, evaporating to dryness, and dissolving the resulting chloride of calcium in a gallon of distilled water. This gallon of chloride of calcium solution accurately represents a natural water whose hardness is due to 16 grains of carbonate of lime in a gallon. A solution of soap in proof-spirit is next prepared of such strength, as that a quantity of it which will fill 32 measures of a volumetric tube, each measure of which contains 10 grains, will be exactly able to convert 1000 grains' measure of the standard solution of hard water into the earthy soap described. This point is thus ascertained: The hard water is placed in a stoppered bottle, and the soap solution added to it by degrees, the bottle being shaken after each addition, when a bubble will form, which rapidly disappears so long as any lime is present; but when at last it is all used up, a froth of soap bubbles remains after hard shaking, such as to last unbroken for three minutes. If, now, a given sample of water be examined, and this point is reached at the expense of the entire 32 measures, it is a water of 16 degrees of hardness. Now, perfectly soft water consumes 2 measures of the soap solution before permanent bubbles are formed, so that a water of 16 degrees of hardness has in reality only consumed 30 measures of the soap solution. But $\frac{16}{30} = 0{\cdot}53$; hence, if any given measures of the soap-test be used in estimating the hardness of a water, we must first subtract 2 from the amount, and then multiply by 0·53; and the result will give us the degree of hardness. For example, let a given sample require 27 measures of the soap-test. On subtracting 2, and multiplying by 0·53, we find its hardness to be 12·25. Clark's Soap-test Table for Hardness of Water is given in the article 'Soap-test' in Knight's *English Cyclopædia*; and full details regarding the mode of working the test, to determine the amount of lime, magnesia, soda, sulphuric acid, and pure carbonic acid, are given in Dr Parkes's *Manual of Practical Hygiene* (Lond. 1864).

SOAPWORT (*Saponaria*), a genus of plants of the natural order *Caryophyllaceæ*, having a cylindrical or ventricose 5-toothed calyx, without any



Soapwort (*Saponaria officinalis*).

outer calyx or attendant bracteæ, five undivided petals with long claws, ten stamens, two stigmas, and a capsule opening at the top by four valves. Some of the species have very beautiful flowers. *S. Calabrica* has of late become one of the most favourite annuals of our flower-gardens.—COMMON S. (*S. officinalis*) is found on waysides, in thickets, and on the banks of streams, in most parts of Europe, although it is a somewhat doubtful native of Britain. Both the root and the leaves contain Saponin (q. v.), in consequence of which they are sometimes employed for washing. The brownish-red colour of the bark of the root, however, is apt

to tinge white articles. The root of this plant has also medicinal properties, being aperient, resolvent, and alterative. It is sometimes sold as RED SOAP-ROOT.

Nearly allied to the genus *Saponaria*, but having an angular calyx and a 5-valved capsule, is the genus *Gypsophila*, some species of which are called SOAP-ROOT, and contain much saponin. Thus, the EGYPTIAN SOAP-ROOT (*G. struthium*), and the SPANISH SOAP-ROOT (*G. Hispanica*), called *Jabonera* in Spain, have been employed for washing from time immemorial, and the roots not having a dark rind, can be used for washing white articles, and are to some extent an article of commerce, being used for silken and other stuffs, the colours of which will not bear the application of soap. The roots of *Lychnis dioica*, one of the most common British plants, possess the same properties in an inferior degree.—The bark of *Quillaja saponaria*, a Chilian tree of the natural order *Rosaceæ*, contains much saponin, is generally used for washing in Chili and Peru, and there forms a considerable article of commerce.—Some of the tropical South Sea Islands produce a species of vine (*Vitis saponaria*), the stem of which, especially the thicker part, cut into pieces, and softened by cooking on hot stones, produces in water a rich lather almost equal to that of soap. See also SOLANUM.

SOBBING is merely a modification of the ordinary movements of respiration excited by mental emotions. It is the consequence of a series of short convulsive contractions of the diaphragm, and is usually accompanied by a closure of the glottis, temporarily preventing the entrance of air into the lungs.

SOBRAO'N, a village on the left bank of the Sutlej, 25 miles east-north-east of Ferozpur, near which, on 10th February 1846, a most obstinate battle was fought between the British army of 15,000 men, under Sir Hugh Gough, and a Sikh force numbering 30,000. The Sikhs were strongly intrenched, and vigorously resisted the attacks of their opponents, but the courage and perseverance of the latter ultimately gave them the mastery; the various earthworks were captured in succession, and the Sikhs driven across the Sutlej, with a loss in killed, wounded, and drowned of 13,000. Gough immediately followed up his victory by crossing into the Punjab in pursuit of the fleeing enemy.

SOCAGE, or **SOCCAGE** (originally *hlaford-socn*, seeking a lord; whence we have also *soc*, a right of holding a court), a tenure of lands in England, of which the characteristic feature is, that the service is fixed and determinate in quality, thereby differing both from knight-service and from villeinage. It was originally peculiar to the Anglo-Danish districts of England. At the time when the allodial tenure was converted into immediate dependence on the crown, this tenure seems to have arisen out of the necessity for commendation or seeking a lord. In Domesday, socmen are often mentioned as bound 'to seek a lord,' or free to go with their land where they pleased. The socmen of Stamford are said to be free to seek a lord, being only liable to the king for the toll attached to them as inhabitants of a borough. The obligation of socage in its origin has been compared to the mutual bonds of allegiance of later times so common in the Highlands of Scotland, and known as Bonds of Manrent (see MANRENT). Three kinds of socage have been enumerated as existing at a later period—viz., free and common socage, socage in ancient tenure, and socage in base tenure. The second and third kind are equivalent to tenure in ancient demesne and copyhold tenure (see DEMESNE, ANCIENT, and COPYHOLD), and the first is what has generally and more properly been denominated socage, where the services were both certain and honourable. Besides fealty, which the socager was bound to do when required, he was obliged to give attendance at the court baron of his lord, if he held one, either for a manor or for a seigniory in gross.

By an act passed during the Commonwealth, and confirmed after the Restoration by 12 Car. II. c. 24, tenure by knight-service was abolished, and all lands except church-lands held in free alms, were directed to be held in free and common socage, which is now (with that exception) the universal tenure of real property in England and Ireland.

Socage tenures are unknown in Scotland, where, unless at a very early period, they never existed.

SOCIALISM, the name given to a class of opinions opposed to the present organisation of society, and which seeks to introduce a new distribution of property and labour, in which organised *co-operation* rather than *competition* should be the dominating principle, under the conviction that the happiness of the race, and especially of the classes without capital, would be benefited thereby. Historically considered, Socialism, like many of the significant phenomena of our age, is a product of the French Revolution. That terrible outburst of popular discontent is most properly regarded as an anarchic attack on the social system that had its roots in the feudalism of the middle ages. The furious hatred of the court and the aristocracy, the passionate love of the 'people,' of 'humanity,' of 'liberty,' though called forth by special circumstances, and never formally worked out into a theory of social life, virtually contained in themselves the germs of all later proposed organisations. In the middle ages, the *right* of freely and fully enjoying life, property, and political independence was limited to a favoured few; while the great masses were condemned to dumb servitude, and a perpetual minority. Even the industrial population did not recognise the Socialistic idea. The members of the different guilds or fraternities claimed exclusive right to exercise certain branches of industry, and probably the great majority of the inhabitants of a town remained in a disregarded and dependent state. Amid such social conditions, resting, as they did, on a belief in the necessity of different distinct ranks, the free action of individual life, and even the vital progress of the whole community, became well-nigh impossible. We have not space here to trace the course of the various minor reforms that weakened the authority of the medieval theory of life; but we must not omit to notice the speculations of the political philosophers of the 18th c. in France, England, and Germany, as operating powerfully in favour of a new social system, in which the idea of humanity (assuming, at the French Revolution, as we have observed, the concrete form of the 'people') stands out prominently. Nevertheless, the first shape that the modern spirit of industry took, was not Socialistic, in the strict and proper sense of the term: it was rather individualistic, and found, as it still finds—for it is yet the prevailing theory—its natural expression in such proverbs as, 'A fair field, and no favour;' 'Every one for himself, and God for us all.' But still, even this lawless individualism is to be regarded as a protest against the false *class*-legislation of preceding times, and as an assertion of the absolute right of *each member of society* to a share in the general welfare. That it has not universally commended itself to civilised mankind, as a perfect system, is demonstrated by the appearance and temporary popularity of such schemes of society as those of Owen (q.v.), Fourier (q.v.), St Simon (q.v.), and the enthusiasm excited at

intervals in different parts of Europe by the promulgation of extreme communistic opinions. See COMMUNISM. It is objected to Socialism, under its various forms, that it makes human happiness too much dependent on material gratifications; that it robs man of that energy that springs from ambition; that it unphilosophically ignores an individualism and inequality to which Nature herself has given her inviolable sanction; and that, by the abolition of social rewards and punishments, it neither holds out any hope to the industrious, nor excites any apprehension among the indolent. On the other hand, we must admit that the vigorous assertion of Socialistic principles has led men to a more liberal and generous view of humanity as a whole. Moreover, it has forcibly called public attention to numerous evils that have sprung up along with the modern development of industry, for which no remedy—not even a name—had been provided; to the vital inter-dependence of all classes; and to the inadequacy of the individual or 'selfish' system, as it has been called, to redress the wrongs or cure the evils that inevitably spring from its own unchecked operation.

SOCIAL SCIENCE, a name that has of late years been given to the study of all that relates to the social improvement of the community. A society, called 'The National Association for the Promotion of Social Science,' was first organised at a meeting which was held at Lord Brougham's residence in Grafton Street, in July 1857, to consider the best means of uniting together all those interested in social improvement. Lord Brougham was appointed President; and at the request of the deputation from Birmingham, it was agreed that the first meeting should be held in that town. The annual meetings have been held each year at a different place. The Association was at first divided into five departments—Jurisprudence, Education, Punishment and Reformation, Public Health, and Social Economy—this last dealing with questions regarding capital, labour, and production; an additional department was added in 1860, under the title of Trade and International Law. The Association aims at promoting improvement in all matters falling within these departments, by means of bringing together, for free discussion, societies and individuals interested in the social problems which they involve. The amount of discussion has, at all the meetings, been very considerable, though there is some diversity of opinion as to whether the results have materially aided in solving the more difficult questions of the day.

SOCIETIES are associations of individuals for the promotion or accomplishment of some particular object. Such objects are numerous, including the promotion and investigation of almost every well recognised branch of science, art, and literature; the diffusion of knowledge, religion, and morality; intercourse between those of the same profession or trade; the removal of legal grievances; mutual aid in case of distress; and an abundance of other aims, which are either beneficial to the general public, or to the members of the society alone. In Great Britain, any number of persons may agree to constitute themselves a society, if the object of their union is legal. Those whose objects are scientific or literary are occasionally called *Academies* (q. v.), and under this or their own special names will be found notices of the chief societies at present existing. 'Secret' societies for the accomplishment of some object which involves a subversion of existing political arrangements, spring up from time to time in France, Ireland, Italy, &c.

SOCIETY ISLANDS, a small archipelago in the South Pacific Ocean, in lat. 16°—18° S., long. 148°—155° W., is formed of two clusters of islands, about 70 miles apart, and, in former times, politically distinct; both are now under French rule. Exclusive of islets, the group is formed of 13 islands—Tahiti or Otaheite, Maitia, Eimeo, Maiaoitia, Tetuaroa, Huaheine, Raiatea, Otaha, Borabora, Marua, Tuba, Lord Howe's Island, and Scilly Island. Area estimated at 580 sq. m. (*Almanach de Gotha*, 1865), pop. 9000 (*Les Colonies de la France*, par J. Duval, 1864). All the islands closely resemble each other in appearance. They are mountainous in the interior, with tracts of low-lying and extraordinarily fertile land occupying the shores all round from the base of the mountains to the sea. They are surrounded by coral reefs, are abundantly watered by streams, and enjoy a temperate and agreeable climate. Almost every tropical vegetable and fruit known is grown here; but agriculture is in a backward state. The animals are those usually found in the South Sea Islands. The inhabitants belong to the Malay race, are affable, ingenious, and hospitable, but volatile and sensual. The practice of tattooing has almost wholly disappeared, and the native costume now closely resembles that of civilised nations. There are now no native manufactures, these having been entirely superseded by imported goods. Cocoa-nut oil, oranges, lime-juice, kauri shells and pearl shells are the principal articles exported; and cocoa-nuts are the general article of barter throughout the islands for calicoes, cotton cloth, knives, cordage, groceries, &c., which are imported chiefly from Tahiti. The exports from Tahiti, the principal island, amounted in 1863 to £21,960, and the imports to £75,888.

Tahiti is said to have been visited as early as 1606. Captain Cook reached it in 1769, and discovered many of the other islands of the archipelago, to which he gave the name of S. I., in honour of the Royal Society of London. In 1797, the first mission-ship fitted out by the newly formed London Missionary Society arrived at Tahiti. After 19 years of apparently fruitless labour, the influence of the missionaries began to be felt, and soon afterwards became so powerful as to be almost paramount. A quarrel between the Protestant and Roman Catholic missionaries, who thought it better to enter upon ground already occupied by Protestants than to take up new ground for themselves, occasioned the interference of France in favour of the latter, and the island of Tahiti was taken possession of in the name of Louis Philippe, by a strong French force in 1844. All the possessions of the native ruler—who, however, still enjoys nominal authority—were afterwards placed under the protection of France, and the S. I., though still nominally a protected state, may be considered as virtually a French colonial possession. Many of the Protestant missionaries left the island in consequence of the interference of the French authorities with their labours. Some, however, remained, and the congregations continued to meet. An application to the British government procured a concession on the part of the French government of some of the rights of religious liberty, which had been taken away by the local authorities.

SOCINUS, the name of two celebrated heresiarchs, uncle and nephew, who have given name to a sect of Christians, the Socinians, better known, however, as Unitarians (q. v.).—LÆLIUS SOCINUS, the elder of the two, was born at Siena, in Tuscany, in 1525, and belonged to a family that had long been distinguished for its cultivation of literature and science. His father, Marianus Socinus, was an able lawyer, and designed his son for the

same profession. But Lælius soon displayed a strong preference for theological inquiry, and in order to better prosecute his biblical studies, he made himself familiar with Greek, Hebrew, and Arabic. The only result of his legal training that one can discern is an obstinate aversion to believe anything 'unreasonable.' The principles of the Reformation had slowly found their way into Italy, and in 1546, a secret society was formed at Vicenza for the discussion of religious questions. It was composed of 40 persons, distinguished by their rank, their occupations, and their titles. S. was admitted a member. The conclusions at which they arrived were unfavourable to the dogma of the Trinity, which they held to have been borrowed by the early church from the speculations of Greek philosophers. The purpose of their meetings together having been discovered, the society broke up. Some of the members were arrested and put to death, others sought safety in flight. Among the latter was S., who travelled in France, England, Holland, Germany, and Poland, making the acquaintance, and acquiring the esteem, of many transalpine scholars, and finally settled in Zürich, where he died in 1562, when only 37 years of age. Lælius S., unlike most heretics, was a prudent and reticent man. His speech at least never bewrayed him; but in his correspondence with his Italian relatives and friends, he showed himself an ardent and eloquent disputant, and made not a few proselytes. Once, in a moment of mistaken confidence, he disclosed himself to Calvin, who grimly warned him to get rid of his 'itch of inquiry,' lest he should 'draw on himself great torments.' In the same year occurred the murder of Servetus.—See Illgen's *Vita Lælii Socini* (Leip. 1814), and *Symbolæ ad Vitam et Doctrinam Lælii Socini* (Leip. 1826).

SOCINUS, FAUSTUS, nephew of the preceding, was the son of Alessandro Socinus, and was also born at Siena, 5th December 1539. By the mother's side, he was very highly connected; but having lost his parents while still young, his education was carelessly conducted; and he himself, at a later period, lamented the imperfection of his scholastic culture. His want of learning, however, only induced him to speculate the more freely, and thus it happened, partly from native bias, and partly from his uncle's epistolary arguments, that Faustus was a heretic and anti-Trinitarian before he was out of his teens. In 1559, when only 20 years of age, he found it advisable to seek an asylum in France, and was living at Lyon when he got news of his uncle's death. He immediately proceeded to Zürich, and possessed himself of his relative's MSS., after which he returned to Italy. He entered the service of the Grand Duke of Tuscany, and during twelve years seemed to forget, amid the cares of office and the dissipations of a court, the thorny questions of theology. But at the expiry of that period, he was seized with a stronger desire than ever to investigate the truths of religion, and in spite of all remonstrances, proceeded to Germany—the centre of theological activity. In 1574, he retired to Basel, to prosecute his studies more closely; but a disputation which he had with a certain Fr. Pucci (1578), obliged him to leave Switzerland. At the request of George Blandrata, he visited Transylvania, where anti-Trinitarians were numerous, especially among the nobles, and eagerly sought (not without success) to make converts to his opinions. In 1579 he went to Poland. Anti-Trinitarianism was even stronger there than in Transylvania, and S. soon obtained a great influence. He preached, and disputed, and wrote with a zeal that Socinianism has seldom displayed since. His position in relation to the Reformers was, that Luther and Calvin had rendered great services to the cause of religion, but that they had not gone far enough, that the only solid basis on which Protestantism could rest was human 'reason,' that everything that contradicted it should be rejected as false and incredible, and that dogmas that were absurd should not be allowed to shelter themselves from criticism because their defenders chose to call them 'mysteries.' The Protestants were alarmed, and the ablest among them undertook publicly to confute Socinus. A disputation was held in the college of Posna, which ended in S. reducing all his opponents to silence; but they retaliated (after the unscrupulous fashion of the times) by trumping up against their vanquisher a charge of sedition, which, although ridiculously groundless, made it necessary for S. to withdraw from Cracow. While living in retirement on the estate of a Polish noble, Christopher Morsztyn, he married the daughter of his protector. She seems to have been a tender and affectionate wife; and when S. lost her in 1587, he almost broke his heart through grief. About this period, his property in Italy was confiscated; but he had powerful and wealthy friends in Poland, who proved generous to him in his needs. In 1588, he took part in the synod of Brest (on the borders of Lithuania), and combated all the principal dogmas of the church—the divinity of Christ, propitiatory sacrifice, original sin, human depravity, the servitude of the will, and justification by faith. In 1598, on the publication of his *De Jesu Christo Servatore*, his enemies stirred up the populace of Cracow against him; and S. was pulled from a sick-bed, and nearly murdered. Soon after, he left the city, and found a refuge with one of his friends in the village of Luclavie, where he died, 3d March 1604. S.'s works are no longer read; but his opinions have never wanted advocates in any Protestant country. He and his uncle may be regarded as precursors of that spirit of Rationalism which has rooted itself so deeply in the thought of the modern world.—See Przipcow's Life of S., prefixed to a collection of his works in the *Bib. Frat. Polonorum* (Amst. 1656); Bayle's article in the *Dictionnaire*; and Toulmin's *Memoirs of the Life, Character, &c. of F. S.* (Lond. 1777).

SOCLE, a plain plinth, forming a pedestal for the support of a statue, column, &c.

SO'COTRA, an island in the Indian Ocean, off the east coast of Africa, 140 miles north-east of Cape Guardafui. It is 70 miles long, 15 miles in average breadth, has an area of upwards of 1000 sq. m., and from 4000 to 5000 inhabitants, mostly Bedouins. The surface consists for the most part of a table-land of from 700 to 800 feet high, and low plains skirt the northern and southern shores. All the streams of the island, with the exception of a few rivulets, are dry at a certain season; but rain-water is collected in reservoirs, and in most parts water can be obtained by digging a few feet below the surface. Owing to the somewhat unfertile character of the soil, most of the districts are more adapted for pasture than for agriculture; but grain, fruits, and vegetables are grown in the eastern districts. The aloe plant and the dragon's-blood tree are the chief commercial products. S. is included in the Imamat of Muscat.

SOCRATES, the celebrated Greek philosopher, was born at Athens in the year 469 B.C. His father, Sophroniskus, was a sculptor; and he followed the same profession in the early part of his life. His mother, Phænarete, was a midwife, to which avocation he was wont to compare his own peculiar method of conversational teaching. His family was respectable in descent, but humble in point of

means. His physical constitution was robust to an extraordinary degree, enabling him to endure the hardest military service, and to live his own chosen life of superiority to all wants above the barest necessaries of life. While his ordinary diet was simple and abstemious, he could, on religious festivals or social occasions, drink more wine than any one else without being intoxicated. He had the usual education of an Athenian citizen, which included not only a knowledge of the mother-tongue, and readings in the Greek poets, but also the elements of arithmetic, geometry, and astronomy as then known. As a young man, he frequented the society of the physical philosopher, Archelaus (a disciple of Anaxagoras); but the philosophers that did most to determine his own special turn of mind must have been Parmenides and 'the double-tongued and all-objecting Zeno.'

Excepting in connection with his philosophical career, few circumstances of his life are known. He served as a hoplite, or heavy-armed foot-soldier, at the siege of Potidæa, at the battle of Delium, and at Amphipolis, and his bravery and endurance were greatly extolled by his friends. On two memorable occasions, he stood forward in political life. After the battle of Arginusæ, in 406, the ten generals in command were publicly arraigned for neglecting to obtain the bodies of the killed to receive the rites of interment. The clamour for their condemnation was so great, that the court wished to proceed in violation of the legal forms; but S., as the presiding judge, firmly refused to put the question. The other occasion was during the tyranny of the Thirty, who took up the policy of compelling a number of influential citizens to take a part in their illegal murders and confiscations; but S. withstood them at the peril of his own life.

Somewhere about the middle period of his life, he relinquished his profession as a statuary, and gave himself up to the career that made him famous. Deservedly styled a philosopher, he neither secluded himself for study, nor opened a school for the regular instruction of pupils. He disclaimed the appellation of teacher; his practice was to talk or converse, 'to prattle without end,' as his enemies said. 'Early in the morning, he frequented the public walks, the gymnasia for bodily training, and the schools where youths were receiving instruction; he was to be seen in the market-place at the hour when it was most crowded, among the booths and tables where goods were exposed for sale. His whole day was usually spent in this public manner. He talked with any one, young or old, rich or poor, that sought to address him, and in the hearing of all who chose to stand by. He visited all persons of interest in the city, male or female; his friendship with Aspasia is well known; and one of the most interesting chapters of Xenophon's *Memorabilia* recounts his visit to and dialogue with Theodotê—a beautiful *hetæra*, or female companion. Nothing could be more public, perpetual, and indiscriminate as to persons than his conversation; and as it was engaging, curious, and instructive to hear, certain persons made it their habit to attend him in public as companions and listeners. These men, a fluctuating body, were commonly known as his disciples or scholars, though neither he nor his personal friends ever employed the terms *teacher* and *disciple* to describe the relation between them.' —Grote's *Greece*, chap. lxviii.

Another peculiarity of S. was his persuasion of a special religious mission. He had been accustomed all his life to hear what he considered a divine voice, or preternatural sign, which came to him solely as a prohibition or warning, and never as an instigation to act. In deference to it, he had kept back from entering public life, and it caused him to refrain from premeditating the defence that he made on his trial. Nor was this all; relying, like his countrymen, on divine intimations by dreams and oracles, he believed that his mission had been signified to him by these. One oracular intimation in particular he described in his defence as the turning-point of his life. An admirer and friend of his, Chærephon, about the time when he began to have some repute as a wise man, consulted the oracle at Delphi as to whether any man was wiser than Socrates. The priestess replied: 'None.' The answer, he said, perplexed him very much; for he was conscious to himself that he possessed no wisdom on any subject, great or small. At length, he resolved to put the matter to the test by taking measure of the wisdom of other persons as compared with his own. Selecting a leading politician, accounted wise by himself and by others, he put a series of questions to him, and found his supposed wisdom was no wisdom at all. He next tried to demonstrate to the politician himself how much he was deficient; but found him impracticable on this head, refusing to be convinced. He then saw a meaning in the oracle, to the effect that his superiority to others lay not in his wisdom, but in his being fully conscious of his ignorance. He tried the same experiment on other politicians and rhetors, then on poets, and lastly on artists and artisans, and with the same result. Thereupon, he considered it as a duty imposed upon him by the Delphian god to cross-question men of all degrees as to their knowledge, to make them conscious of their ignorance, and thereby put them in the way of becoming wise. We shall see presently wherein this low view of the human intelligence differed from the contemptuous tone of a mere satirist.

The intellectual characteristics of S., through which he influenced the whole subsequent course of human thought, may be stated under three heads: 1. Subject, 2. Method, and 3. Doctrine.

1. As to Subject.—Here he effected a signal revolution, metaphorically expressed by the saying of Cicero, that 'Socrates brought down philosophy from the heavens to the earth.' The previous philosophies consisted of vast and vague speculations on nature as a whole, blending together Cosmogony, Astronomy, Geometry, Physics, Metaphysics, &c. S. had studied these systems, and they left on his mind a feeling of emptiness and unsuitability for any human purpose. It seemed to him that men's endeavours after knowledge would be better directed to the human relationships, as involving men's practical concerns. He could not go to any public assemblage without hearing questions agitated respecting the just and unjust, the honourable and base, the expedient and hurtful; moreover, he found that the opposing disputants were, without knowing it, very confused in their ideas as to the meanings of those large words in which the weightiest interests centred. Accordingly, he was the first to proclaim that 'the proper study of mankind is man;' human nature, human duties, and human happiness made up a field of really urgent and profitable inquiry. In astronomy, he saw a certain utility for navigation, and for the reckoning of time, to which extent he would have it known by pilots and watchmen; geometry was useful in its literal sense of land-measuring; arithmetic he allowed in like manner so far as practically useful; but general physics, or the speculations of philosophers, from Thales downward, as to the origin of all things out of water, fire, air, &c., he wholly repudiated. 'Do these inquirers,' he asked, 'think that they already know *human* affairs well enough, that they thus begin to meddle with divine? Do

they think that they shall be able to excite or calm the winds at pleasure, or have they no other view than to gratify an idle curiosity?' He considered it not only unprofitable but impious to attempt to comprehend that department. The gods, he thought, managed all those things after their own fashion, and refused to submit them to invariable laws of sequence, such as men might discover by dint of study; the only means of knowledge permitted was religious sacrifice and prayer, and the consultation of the oracles. While this was the appointed way in reference to divine things, it was equally appointed that human things should be learned by diligence in study and investigation.

2. In regard to Method, S. was the author of still greater innovations. It was to little purpose that men applied themselves to human affairs, if they conceived them loosely, and with no regard to evidence. S. introduced at least one element of logical precision into the handling of questions, by insisting on accuracy in Definition and Classification. His mode will be seen in the statement of Xenophon. 'Socrates continued incessantly discussing *human* affairs, investigating --What is piety? What is impiety? What is the honourable and the base? What is the just and the unjust? Men that knew these matters, he accounted good and honourable; men that were ignorant of them, he assimilated to slaves.'

His investigation thus took the form of ascertaining the exact meaning—that is, the definition—of the leading terms in ethics and in politics, the settling of what J. S. Mill calls the *connotation* of a general word, which determines how to apply it rightly to each individual case. The very idea of defining a general term, now so obvious, never seems to have suggested itself to any one previous to Socrates. And his manner of seeking out those definitions is also characteristic, and links itself to his conversational method, and his convicting men in general of ignorance in things that they thought they knew. Professing himself to be able to furnish no exact definition (this professed ignorance was called the Socratic irony) of justice, temperance, courage, &c., and finding every one else quite confident in their ability to supply the want, he asked some one to state his definition; and on its being given, he put a few further interrogations (as he said) by way of making sure that he understood the meaning, but with the speedy effect of driving the respondent into a humiliating self-contradiction. His method is most fully exemplified in certain of the Platonic dialogues, as the first *Alcibiadês*, *Lachês*, *Charmidês*, *Euthyphron*, &c. According to Xenophon, he could pass from his severe cross-examining method, with its humiliating shock of convicted ignorance, and address to his hearers plain and homely precepts, inculcating self-control, temperance, piety, duty to parents, brotherly love, fidelity in friendship, diligence, &c.—such direct admonitory influence being common to him with the so-called Sophists. He probably went beyond the ordinary teaching of the Sophists in exhorting men 'to limit their external wants, to be sparing in indulgence, and to cultivate, even in preference to honours and advancement, the pleasures arising from a performance of duty, as well as from self-examination and the consciousness of internal improvement.' This strain of exhortation, his manner of life in harmony therewith, and the virtual self-immolation of his death, may be considered as the conjoint root of the Cynic and the Stoic philosophies.

3. As regards Doctrine, S. was distinguished chiefly by his theory of virtue. Virtue, he said, consisted in knowledge. To do right, was the only road to happiness; and as every man sought to be happy, vice could arise only from ignorance or mistake as to the means; hence, the proper corrective was an enlarged teaching of the consequences of actions.

We cannot, on any fair interpretation of knowledge, regard this as other than a one-sided view. It takes note of one condition of virtue, since there can be no right conduct without understanding the tendency of actions, or, at all events, the meaning of rules; but it omits, what is also essential, the state of the emotions or dispositions, which may be directed either to exclusively self-regarding ends, or to ends involving also the good of others. There is an obvious connection between the doctrine and the Socratic analogy of virtue to the professions. The virtue of an artisan is almost exclusively contained in his skill or knowledge; his dispositions can usually, though not always, be depended on, through the pressure of his immediate self-interest. But the practice of S. was larger than his theory; for, as already remarked, his exhortations were addressed to men's feelings or sentiments as well as to their intellect. His political doctrines were biassed by the same analogy of special professions. The legitimate king or governor was he alone that knew how to govern well.

In the year 339 B. C., an indictment was laid against S., in the following terms: 'Socrates is guilty of crime: first, for not worshipping the gods whom the city worships, and for introducing new divinities of his own; next, for corrupting the youth. The penalty due is death.' The trial took place before a dikastery, or law-court, composed of citizen-judges, like our juries, but far more numerous; the number present seems to have been 557. His defence is preserved by Plato, under the title *Apology of Socrates*. The tone of it, so admirable to us, was such as to make acquittal all but impossible, from the number of enemies created by his cross-questioning annoyance of all classes of men, and from various other causes. He dwelt on his mission to convict men of ignorance for their ultimate benefit; pronounced himself a public blessing to the Athenians; declared that, if his life was preserved, he would continue in the same course; and regarded the prospect of death with utter indifference. By a majority of either five or six, the charges were declared to be proven. A vote had then to be taken on the sentence. By the Athenian practice, the accuser named a penalty, and the accused was asked to do the same; the judges were restricted to one or other of these. The accuser named death. S., maintaining the same high tone, declared at first that he deserved the highest public reward; but, on the instigation of his friends, he ended by proposing a trifling fine. The court, by a majority, decided for the capital sentence. There was an accidental interval of 30 days before the execution, during which S. in prison conversed with his friends as usual; on the last day occurred his conversation on the Immortality of the Soul, referred to in the Platonic dialogue called *Phædon*. He then drank the hemlock, and passed away with the dignity and calmness becoming his past life.

'There can be no doubt,' says Mr Grote, 'that the individual influence of Socrates permanently enlarged the horizon, improved the method, and multiplied the ascendant minds of the Grecian speculative world, in a manner never since paralleled. Subsequent philosophers may have had a more elaborate doctrine, and a larger number of disciples who imbibed their ideas; but none of them applied the same stimulating method with the same efficacy; none of them struck out of other minds that fire which sets light to original thought; none of them either produced in others the pains of intellectual

pregnancy, or extracted from others the fresh and unborrowed offspring of a really parturient mind.'—See Grote's *Greece*, chap. lxviii.

SODA. See Sodium.

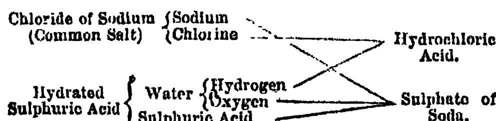
SODA, Manufacture of. Soda, or, more correctly, carbonate of soda, occupies the chief place among our leading chemical manufactures, alike from its own importance, and also on account of its influence on other great chemical industries, such as glass-making, soap-making, bleaching, &c.

A native carbonate of soda, or rather a sesquicarbonate, called Natron (q. v.), is found in Egypt and some other parts of the world. In Hungary, several manufactories exist for the purification of a native soda found there. Formerly, most of the soda in use was extracted from certain plants; and two kinds were known in commerce under the names of Barilla (q. v.) and Kelp (q. v.).

But the quantity of soda got from all other sources is now insignificant in comparison with that manufactured from common salt (chloride of sodium—see Sodium). The process was invented by a Frenchman named Leblanc, and was first made known to the world by a commission of the French republic in 1794, although dating some years earlier. It is unquestionably the most valuable discovery in the entire range of chemical manufactures; and it has been practised for seventy years without any important alteration. It is sad to think that the author of this invention reaped no benefit from it himself, but spent the last of his days in an hospital, 'a wreck in fortune, health, and hope.' Owing partly to the war between France and England, and partly also to the existence of a duty of £30 per ton on common salt, which continued for eight years after the close of the war, Leblanc's process was not adopted in Great Britain till 1823; at least, any attempt to use it before that time was confined to making soda on a limited scale from brine. After the repeal of the tax in that year, Mr James Muspratt erected his celebrated works at Liverpool, adopted the process in its entirety, and succeeded, after overcoming many difficulties, in establishing in Great Britain a chemical manufacture which has since become the most important in the world.

The object of the soda-process is to separate the sodium of the salt, and unite it with oxygen to form caustic soda, or, what is much more generally done, to unite the sodium with both oxygen and carbonic acid to form carbonate of soda. The several stages of the process are as follows:

First Operation—The Production of Sulphate of Soda.—The decomposition of the common salt is effected by treating it with sulphuric acid, which transforms it into sulphate of soda and hydrochloric acid. The following diagram illustrates the interchange of elements which takes place:



This operation was long conducted in a common Reverberatory Furnace (q. v.), and the hydrochloric acid was suffered to escape into the air. Not only was the acid thus lost, but it destroyed all vegetation in the neighbourhood of soda-works, and involved their owners in serious law-suits for damages. The great chimneys of the St Rollox Works, Glasgow, and Mr Muspratt's, Liverpool, which are nearly 500 feet high, were erected with a view of curing this evil, but they were found to be ineffectual. One of the most improved furnaces now in use for the purpose is shewn in figs. 1 and 2. They are built in pairs, and in the front part of each there

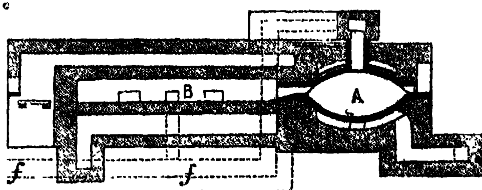


Fig. 1.—Vertical Section of Decomposing Furnace.

is a shallow cast-iron pan A, nine feet in diameter, with a sheet-iron cover, and so built that the fire may act on the bottoms and sides. Behind this, an oblong brick-chamber, B, 30 feet by 9 feet, is situated, with separate fire-places, and called the salt-

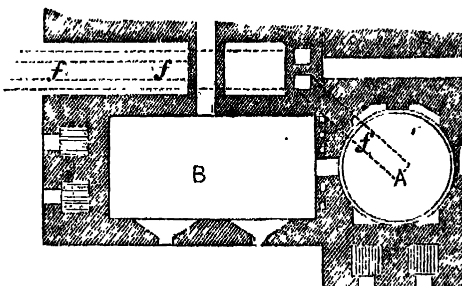


Fig. 2.—Plan of Decomposing Furnace.

cake furnace. Acid flues, *f*, *f*, are led from each compartment of the double furnace into one main flue, which has its outlet into a condensing tower, to be presently described. Separate flues are also provided for the conveyance of smoke to a main chimney. The furnace is worked in the following way: when it is properly heated, salt to the amount of 10 cwts. is thrown in by an opening, and about 80 gallons of strong sulphuric acid are heated and run in. The mixture, which is well stirred with an iron rake, gradually thickens, and in about an hour the pasty mass, not yet all decomposed, is pushed through the opening into the salt-cake chamber, B. Here it is spread out on the sole, and maintained at a red heat for another hour, when the whole of the hydrochloric acid is expelled, and the conversion into sulphate of soda complete. A pair of furnaces, about one-half larger than those above described, will produce about 19 tons of sulphate of soda in a day, for which 16 tons of common salt are required. At the St Rollox Chemical Works, Glasgow, about 500 tons of common salt are decomposed weekly.

A very important part of this operation is the condensation of the hydrochloric acid gas, which is disengaged in large volumes during the decomposition of the salt. As already stated, it was formerly allowed to escape into the atmosphere. The acid flues convey it to the condensing towers (fig. 3), which are generally filled with pieces of burnt coke, through which a supply of water is kept running. The gas enters at the bottom of the first tower, passes upwards, and descends the second, and is gradually absorbed by the water, forming strong liquid acid, which is run out by openings at the bottom of the condenser. So perfect is the system of condensation now in use at some works, that of the acid produced by 100 tons of pure chloride of sodium which should yield 62 tons, as much as 58¼ tons

have actually been collected; and it has been instanced, as a curious illustration of this in another way, that Mr Muspratt's great works,

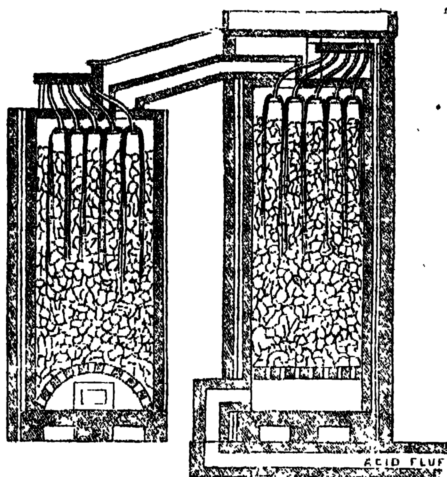


Fig. 3.—Section of Coke Towers for condensing the Hydrochloric Acid Gas.

which were at one time forced out of Liverpool as a nuisance, have been established there again without exciting any complaint, and even without many knowing it. Notwithstanding the perfection thus attained, some manufacturers were either not so careful or not so successful, and their works being still considered obnoxious to their neighbourhoods, an 'Alkali Act' was passed by parliament in July 1863, 'For the more Effectual Condensation of Muriatic (hydrochloric) Acid Gas in Alkali Works.' This act compels every manufacturer of alkali to secure the condensation of not less than 95 per cent. of the muriatic gas evolved in his works, under a penalty not exceeding £50. The hydrochloric acid obtained in this process is mostly used in the manufacture of bleaching powder.

Second Operation—The Conversion of the Sulphate of Soda into Black-ash, called also Ball Soda.—This is effected by heating a mixture of sulphate of soda, carbonate of lime, and coal, in a reverberatory furnace. The proportions now used are the same as those first recommended by Leblanc—viz., sulphate of soda, 100 parts; carbonate of lime, 100 parts; carbon (charcoal), 55 parts. But as coal is employed in England instead of charcoal, the quantity used is generally 75 to 100 of each of the other two ingredients. The 'balling furnace' used in this operation is shewn in fig. 4. It has two beds, the one being raised a few inches above the other. F is the fireplace, the waste heat from which is usually employed in boiling down the soda-lye as indicated in the section. The charge is thrown into the bed, A, of the balling furnace, after it has been raised to a bright red heat, and remains till it becomes sufficiently heated throughout the whole mass. It is then transferred to the *fluxing bed*, B, which is next the fire, and exposed to a higher heat, when it shortly begins to soften and flux into a mass like dough. The chemical changes now take place, and are indicated by many little flames of carbonic oxide termed 'candles' appearing; when these flames become less numerous, the transformation is complete. The charge is withdrawn in a red-hot state by the working door, and received into iron barrows, where it solidifies into blocks of crude soda, termed ball soda, or black-ash. Within the last year or two, a novel form of balling-furnace has been in operation at the Jarrow Chemical Works, South Shields. It consists of a revolving cast-iron cylinder lying in a horizontal position, 11 feet long by 7 feet in diameter, and lined with fire-brick. It is said to heat more uniformly, to decompose the charge better, and to require less skilled labour in the working than the ordinary furnace; but its superiority on the whole is still in some measure disputed.

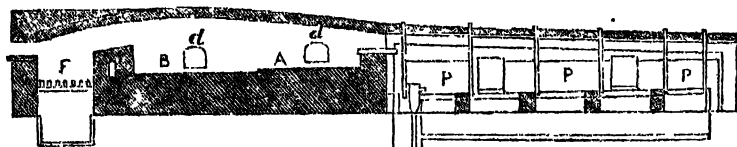


Fig. 4.—Section of Balling Furnace, shewing an evaporating pan for Soda-lye in connection with it.

The theory of this process is involved in considerable obscurity, like many more chemical operations conducted on a large scale in highly heated furnaces: suffice it here to say, that the simplest view of the reactions is, that there is first a reduction of the sulphate of soda to the sulphuret of sodium by the action of the hot coal; and secondly, the conversion of the sulphuret of sodium into carbonate of soda and sulphide of calcium by means of the heated chalk.

Third Operation—The Preparation of Carbonate of Soda from the Black-Ash, by Lixiviation and Evaporation.—For some purposes the crude soda, or black-ash, is used without further purification; for example, in soap-making, in which considerable quantities are consumed. The lixiviation of the crude soda is effected by the use of a series of iron tanks, or vats, into which it is placed with water. The working of these vats will be most simply explained by the apparatus shewn in fig. 5. Several tanks,

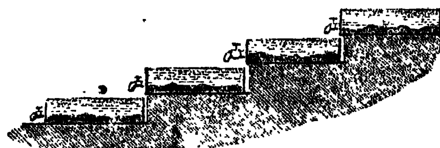


Fig. 5.—Apparatus for lixivating the crude Soda.

each of the capacity of 600 gallons, rise above one another in successive stages, so that the liquor of the highest can be run into the next lower, and so on. The black-ash is introduced fresh into the lowest vat; it then passes from vat to vat, and is taken away exhausted at the highest one. The water, on the contrary, comes in fresh at the top, and in passing downwards encounters less exhausted ash in each succeeding vat, and finally passes away from the lowest a fully saturated solution. In most soda-works, the vats are now arranged differently, although the ash may be said to be exhausted in the same way. In the new arrangement, the vats are placed horizontally, and advantage is taken of the fact that solutions in becoming richer become also heavier, so that, although the tanks are all on a

level, the water runs through them with what is virtually a downward flow. We have not space to describe minutely this very elegant and economical plan; it will be enough to say that it completely obviates the necessity of lifting the ash from vat to vat, because any two contiguous ones can be made at pleasure the highest and lowest points, and, therefore, those of ingress and egress for the lixiviating fluid. 'Each vat, in due rotation, is emptied and refilled; and thus each in turn successively occupies the highest, lowest, and all intermediate points of the declivity.'

The next stage is the evaporation of the soda-lye, which is conducted in a variety of ways. A common method consists in using the waste heat of the balling furnace, the flame from which passes over the surface of the liquor, as shewn in fig. 4. With proper manipulation the soda falls to the bottom, and is raked out at intervals through a side-door, and drained upon a sloping surface. By another system, the lye is evaporated in pans where the heat is applied below, so as to preserve the liquor from contact with the gaseous products of combustion.

The soda-salts (chiefly carbonate of soda), thus obtained by evaporation of the lye, contain caustic soda, which requires to be carbonated, and a little sulphide of sodium, which it is necessary to get rid of. They are accordingly transferred to a reverberatory furnace, and calcined, at a moderate heat, along with sawdust, or sometimes with small coal, the mixture being stirred with iron paddles. By this treatment, the caustic soda is converted into carbonate of soda, the sulphur is mostly expelled, and we now obtain the *soda-ash*, or alkali of commerce, which generally contains about 50 per cent. of real soda, NaO; the other ingredients, besides the carbonic acid with which it is combined, being chiefly water, sulphur, and common salt. Sometimes it is further purified, and it is then known as *white alkali*.

Soda crystals, or what is commonly called 'washing-soda,' are obtained by dissolving the soda-ash in hot water, then filtering the solution and boiling it till the specific gravity reaches 1·3, when it is transferred to the crystallising coolers. Bars of wood or iron are laid across these vessels to sustain the mass of crystals which form, and in ten days at most the crystallisation is complete. Crystals of soda are purer than soda-ash, but they are of much less value, weight for weight, because of the large quantity of water which enters into their constitution, amounting to 62½ per cent.

A new and daily-increasing branch of the soda-trade has sprung up within the last ten years—namely, the manufacture of Caustic-soda. For soap-making, bleaching, and several other purposes, the soda is always used in this state, so that, in those cases, the ordinary carbonate of soda requires to be rendered caustic by quicklime. Manufacturers have, accordingly, taken to the plan of treating the black ash-liquor with hydrate of lime, and so obtain caustic-soda at this stage instead of sending it into the market as a purified carbonate of soda, for purposes where it requires to be decarbonated again. Another plan consists in mixing a small quantity of chloride of lime, or nitrate of soda, with the soda-lye from the black-ash. It is then concentrated into a strong solution and allowed to cool, which separates nearly all the foreign salts. The strong liquor is finally evaporated in round iron pots heated to redness.

Soda is now manufactured in Denmark and the north of Germany from a novel source—namely, the mineral Cryolite, which is a double fluoride of sodium and aluminium. It is found in enormous masses in Greenland, and about 70,000 cwts. are annually quarried in that country.

To give an idea of the great extent of the soda-trade, we quote the following from a recent paper by Mr Gossage, one of the largest alkali manufacturers: 'There are now (1865) 50 establishments in Great Britain, in which soda is manufactured by Leblanc's process, producing about 3000 tons of soda-ash per week, about 2000 tons of soda-crystals per week, about 250 tons of bicarbonate of soda per week, and about 400 tons of bleaching-powder per week. The total annual value of these products may be estimated as exceeding two millions sterling, which is so much entirely added to the annual income of the country, excepting about £100,000, paid for materials obtained from other countries.

'The number of workmen actually employed in the several manufactories, may be estimated as being at least 10,000, exclusive of those engaged in the manufacture of salt, and in mining for pyrites, limestone, and coal.'

SODA-WATER. See AËRATED WATERS.

SODIUM (symb. Na, equiv. 23, spec. grav. 0·972) is one of the metals of the alkalies—its oxide being soda. Its properties closely resemble those of the allied metal, potassium. It is of a bluish-white colour, is somewhat more volatile than potassium, and further differs from that metal in having a higher fusing-point (about 208°), a greater specific gravity, and in not catching fire when dropped in water (unless the water is heated), although, like potassium under similar conditions, it partially decomposes it and liberates hydrogen; and at the same time communicates a strong alkaline reaction to the solution. If, however, a piece of unsized paper is placed on the surface of cold water, and the sodium be placed on the paper, the metal takes fire, and burns with a deep yellow flame. Strictly speaking, it is the liberated hydrogen rather than the metal which burns, the yellow tint (which is characteristic of the sodium compounds) being due to a little sodium volatilised by the heat, mixing and burning with the hydrogen. When heated in the air, it burns with its characteristic yellow flame, and is converted into soda. When exposed *in vacuo* to a red heat it assumes the form of vapour, and admits of distillation. Like potassium, it must be kept immersed in naphtha, so as to exclude the oxidising action of the air. As a reducing agent, it is little inferior to potassium, and as its combining power is lower, and it is obtained much more cheaply, it may usually be advantageously substituted for potassium in reducing operations. Sodium does not occur in the metallic form in nature, but its compounds are very widely distributed. It is found by far the most abundantly in the form of chloride of sodium (or common salt), but it likewise occurs as albite or soda-felspar, cryolite (the double fluoride of sodium and aluminium, and the principal source from whence aluminium is procured), borax (the biborate of soda), trona (the sesquicarbonate of soda), and Chili saltpetre (nitrate of soda).

The methods of obtaining sodium are similar to those already described for obtaining potassium. The following procedure recommended by Deville is regarded as the best for obtaining it in large quantity. Intimately mix 717 parts of dried carbonate of soda with 175 parts of finely powdered charcoal and 108 parts of finely ground chalk, knead them into a stiff paste with oil, heat them in a covered iron pot till the oil is decomposed, and finally distil them in an iron retort with the precautions which are noticed in describing the preparation of Potassium (q.v.). The object of adding the chalk is to prevent the separation of the charcoal from the carbonate of soda

when the latter fuses. This mixture ought to yield nearly one-third of its weight of sodium.

With regard to the history of sodium, it is sufficient to observe that Duhamel, in 1736, discovered that potash and soda (now known to be the oxides of potassium and sodium) were distinct bodies. Sir H. Davy first obtained the metal *Sodium* in 1807. The symbol of this metal, Na, is the abbreviation of *Natrium*, which is derived from *Natron*, one of the old names of native carbonate of soda.

Sodium combines with all the elementary gaseous bodies, and two of these combinations—viz., those with oxygen and chlorine, are of extreme importance and value.

With *oxygen*, sodium forms two compounds—viz., an oxide (NaO) and a peroxide (NaO_2). The latter being of no practical value, may be passed over without notice. The oxide (soda) was formerly known as *fossil* or *mineral alkali*, to distinguish it from potash, which, from the source from which it was procured, was termed *vegetable alkali*. Anhydrous soda (NaO) is procured by burning the metal in dry air; it is of a yellowish-white colour, powerfully attracts moisture, and retains the water so firmly that it cannot be expelled by heat. Hydrated or caustic soda (NaO,HO) closely resembles, both in its properties and in the mode of procuring it, the corresponding potash compound. It is, however, not so fusible as the latter, and is gradually converted, by exposure to the air, into carbonate of soda, which is also an infusible salt in its anhydrous state. Solution of hydrate of soda (or soda lye) is largely employed in the arts. It is prepared by boiling a tolerably strong solution of carbonate of soda in milk of lime until a portion of the filtrate ceases to effervesce on the addition of an acid. The solid hydrate has a specific gravity of 2·13, and the quantity of anhydrous soda in any solution may be pretty closely approximated to by determining the specific gravity of the fluid at a temperature of 59°. Tables for this purpose have been constructed by Dalton (quoted in Miller's *Inorganic Chemistry*, 2d ed. p. 37), and by Zimmerman (reprinted in the article 'Sodium' in Knight's *English Cyclopædia*).

Many of the combinations of the oxide of sodium (soda) with acids—constituting soda-salts—are of great importance. Carbonic acid forms three salts with soda—viz., a normal carbonate, a sesquicarbonate, and a bicarbonate of soda.

The *Normal or Ordinary Carbonate of Soda* ($NaO,CO_2 + 10Aq$), popularly known as the *Soda* of commerce, is a colourless, inodorous salt, with a nauseous alkaline taste. It crystallises in large transparent rhomboidal prisms, which contain nearly 63 per cent. of water, but it readily parts with all this water on the application of heat. The crystals also lose the greater part of their water on mere exposure to the air, when they effloresce, and fall to powder. Water at 60° dissolves half its weight of the crystals, and boiling water considerably more, the solution acting like an alkali on vegetable colours. This salt occurs native in the natron-lakes of Hungary, Armenia, &c., in association with sulphate of soda and chloride of sodium. In other regions it appears in an efflorescent form on the surface of the earth. It is now, however, almost entirely manufactured from sea-salt. See SODA, MANUFACTURE OF.

Sesquicarbonate of Soda ($2NaO,HO,3CO_2 + 3Aq$) occurs native in the form of large, hard, non-efflorescent prisms, in Hungary, Egypt, Mexico, &c., under the name of *Trona* or Natron. When strongly heated, it loses one-third of its carbonic acid, and becomes converted into the preceding salt.

Bicarbonate of Soda ($NaO,HO,2CO_2$) may be formed by passing a current of carbonic acid through a strong solution of carbonate of soda, till saturation takes place, and allowing the mixture to crystallise; or it may be produced on a large scale by exposing crystals of carbonate of soda to a prolonged current of carbonic acid. The bicarbonate crystallises in four-sided prisms, which require 10 parts of water at an ordinary temperature for their solution. This salt is used largely in medicine. See AËRATED WATERS.

Sulphuric acid forms with soda a normal and an acid sulphate.

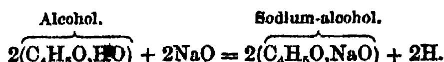
The *Normal or Ordinary Sulphate of Soda* ($NaO,SO_3 + 10Aq$) has been already described under its synonym of *Glauber's Salt* (q. v.). The acid salt, or *bisulphate* of soda ($NaO,HO,2SO_3$), is of no special interest.

The *Hyposulphite of Soda* ($NaO,S_2O_2 + 5Aq$), occurs in large colourless, striated, rhombic prisms, of a cooling and sweet taste. When strongly heated in the air, it burns with a blue flame. It dissolves readily in water, depositing sulphur if the solution be kept in a closed vessel. It may be obtained by digesting a solution of sulphite of soda on powdered sulphur. The sulphur is gradually dissolved, and forms a colourless solution, which, on evaporation, yields crystals of hyposulphite of soda. This salt is largely employed in photography, and is occasionally prescribed medicinally. Sulphurous acid forms two salts with soda—viz., a sulphite and a bisulphite. The *Sulphite of Soda* ($NaO,SO_2 + 7Aq$) is obtained by passing sulphurous acid over carbonate of soda, dissolving the resulting mass in water, and crystallising; when the salt is obtained in efflorescent oblique prisms, which fuse at 113°, and are soluble in 4 parts of cold water, the solution having a slightly alkaline reaction, and a sulphurous taste. This compound is commercially known as *Antichlore*, and is largely used in paper-manufactories for the purpose of removing the last trace of chlorine from the bleached rag-pulp. The *Bisulphite* is of no importance. *Nitrate of Soda* (NaO,NO_5), known also as *Cubic Nitre* or *Chili Saltpetre*, occurs as a natural product on the surface of the soil of certain South American districts. In most of its properties, excepting its crystalline form, and further in its being deliquescent, it resembles nitrate of potash. It is used to a considerable extent as a manure. The *Phosphates of Soda*, though comparatively numerous, do not call for notice here. See PHOSPHATES. *Hypochlorite of Soda* (NaO,ClO) is at present only known in solution, in which it occurs as a yellowish-green fluid, evolving a smell of chlorine; it has strong bleaching power, and, when boiled, becomes decolorised, and evolves chlorine freely. It is formed by passing a stream of chlorine gas through a solution of carbonate of soda, the resulting solution containing the hypochlorite, together with undecomposed carbonate of soda and chloride of sodium. This solution is useful as a bleaching agent, as an oxidising agent in analytical chemistry, and as a disinfectant agent. There are two *Borates of Soda*, of which the only important one, the *Biborate*, is already described under its ordinary name of *Borax* (q. v.). Various *Silicates of Soda* have been formed. In reference to the properties of these salts, see the articles FUCHS'S SOLUBLE GLASS and GLASS.

The *Haloid Salts* of sodium resemble, in their general characters, the corresponding salts of potash. Of these, by far the most important is *Chloride of Sodium* or *Common Salt*, formerly known as *Muriate of Soda* (NaCl). It occurs naturally in far greater quantity than any other soluble salt. See ROCK-SALT, SEA, WATER. The following are its leading

properties: It crystallises in colourless, transparent cubes, which are anhydrous, soluble in about 3 parts of cold water, and scarcely more soluble in boiling water. A saturated solution has a specific gravity of 1·205, the specific gravity of the salt being 2·125. It is insoluble in pure alcohol, is inodorous, and has a purely saline taste, unmingled with bitterness, unless chloride of magnesium be mixed with it. At a red heat, it fuses, and becomes converted into a transparent brittle mass. The well-known decrepitation which occurs when salt is thrown on the fire, or otherwise strongly heated, results from the sudden expansion of water mechanically entangled amongst its particles. The uses of this salt have been known from the earliest times. It is an essential constituent of the food both of man and animals. From want of space, we must refer our readers to Liebig's *Letters on Chemistry* (Letter xxviii.) on this subject, in which the functions of salt in the food and in the blood are clearly pointed out. It is regarded as a necessity even by the rudest nations. 'In several countries of Africa, men are sold for salt; amongst the Gallas and on the coast of Sierra Leone, the brother sells his sister, the husband his wife, parents their children, for salt; in the district of Accra (Gold Coast), a handful of salt, the most valuable merchandise after gold, will purchase one, or even two slaves.'—Note to Liebig's *op. cit.*, p. 413. Chloride of sodium is employed in the process of salting meat, in consequence of its powerful antiseptic properties. Meat thus prepared loses, however, a considerable portion of its nutritive juices, which pass into the brine; and is less digestible than in its natural state. Amongst the purposes for which this salt is mainly employed may be mentioned the manufacture of the various salts of soda, especially the carbonate; the preparation of hydrochloric acid; the glazing of stoneware; the preparation of soap; &c. The other haloid salts—the iodide, bromide, and fluoride of sodium—require no notice.

Sodium has been recently found to enter into various groups of organic bodies. We shall take the sodium-alcohols as an example. When sodium or potassium is gradually added to anhydrous alcohol, the temperature rapidly rises, the metal is dissolved, hydrogen is evolved, and a fusible deliquescent compound is formed, which has received the name of *Sodium-alcohol* (or potassium-alcohol), or of *ethylate of soda* (or potash), its composition being such that it may be regarded as alcohol in which one atom of hydrogen is replaced by one of the metal; as shewn in the equation:



$$2(\overbrace{C_4H_5O,HO}^{\text{Alcohol.}}) + 2NaO = 2(\overbrace{C_4H_5O,NaO}^{\text{Sodium-alcohol.}}) + 2H.$$

The action of sodium or potassium on the other alcohols is of an analogous nature.

The *tests* for the salts of sodium are not very satisfactory, because the metal forms scarcely any insoluble compounds. A salt of sodium is usually concluded to be present when, the absence of all other bases having been proved, a saline residue remains, which, with bichloride of platinum, yields yellow striated prisms ($NaCl,PtCl_2 + 6Aq$) by spontaneous evaporation. Before the blowpipe, the salts of sodium are known by the intense yellow which they communicate to the outer flame, and if a weak alcoholic solution of one of the salts is burned, a similar yellow tint is communicated to the flame. Spectrum analysis is too delicate to be of much practical use. Bunsen estimates the amount of soda that may be thus detected at the 195,000,000th part of a grain; and considering how universally diffused chloride of sodium is, this fractional amount is hardly likely to be absent.

In conclusion, the *medicinal uses* of the sodium compounds require our notice. They will be considered alphabetically. *Acetate of Soda* is a mild diuretic, similar in operation to acetate of potash, for which it may be substituted. It may be given in doses varying from a scruple to a couple of drachms. *Arseniate of Soda* ($2NaO,HO,AsO_5+14Aq$) is serviceable in periodic affections, chronic skin-diseases, and the cases in which arsenic is generally employed in medicine. It has all the advantages of arsenite of potash, and seems to cause less irritation of the stomach. It is best given in the form of *Pearson's Solution*, which consists of one grain of the crystals of this salt dissolved in ten drachms of distilled water. Dose, from 20 minims, very gradually increased to two drachms, three times daily. The *Liquor Sodæ Arseniatis* of the Pharmacopœia is much stronger; its dose being from three to ten minims. Paper impregnated with a solution of arseniate of soda sweetened with sugar is sold as a poison for flies. *Biborate of Soda*, or *Borax*, is employed principally as a topical astringent, and is used with advantage in aphthous eruptions of the mouth and throat. *Bicarbonate of Soda* is a most popular remedy in cases of dyspepsia, but its use is highly injurious when there are phosphatic deposits in the urine. See PHOSPHATIC DIATHESIS. Neligan strongly recommends the external application of an ointment consisting of 20 or 30 grains of the bicarbonate, with an ounce of cold cream, in cases of papular and vesicular eruption of the scalp. *Carbonate of soda* is not employed as an antacid so frequently as the bicarbonate, in consequence of its disagreeable taste; but in the dried state, when deprived by heat of its water of crystallisation, it is much used as an alterative. In dyspepsia attended with acidity, a combination of the dried carbonate with blue pill and rhubarb pill is often extremely useful. As it has a very acrid taste, it should be combined, if given in powder, with some bland substance, such as Compound Tragacanth Powder. *Solution of Chlorinated Soda* (known also as *Solution of Chloride of Soda, Chlorinated Soda, Hypochlorite of Soda*, and *Labarraque's Disinfecting Liquor*) is preferable to hypochlorite of lime in destroying noxious effluvia, as the salt which is left does not deliquesce, while chloride of calcium is very deliquescent. It may be applied locally to foul ulcers, either in lotion (2 drachms to 8 ounces of water), or as a poultice with linseed meal and boiling water. *Phosphate of Soda* ($2NaO,HO,PO_5 + 24Aq$), known also as *Tasteless Purging Salt*, is a mild saline purgative, with a far less unpleasant taste than sulphate of magnesia. It is especially adapted as a purgative for persons affected with deposits of red gravel (lithic or uric acid) in the urine. The dose varies from half an ounce to two ounces, and it may be given in broth, to which it imparts only a saline taste. *Sulphate of Soda*, and *Tartrate of Soda and Potash*, have been already described under their ordinary names of *Glauber's Salt* (q. v.) and *Rochelle Salt* (q. v.).

SODOM AND GOMO'RRAH, two ancient cities of Syria, almost invariably spoken of in conjunction in the Bible, and forming with Admah, Zeboiim, and other towns, the 'cities of the plain,' which, on account of the enormous wickedness of their inhabitants (the nature of which is indicated in the term Sodomy), are said to have been overthrown—not submerged—by some terrible convulsion of nature. Modern writers on sacred topography are not agreed as to the precise site to be assigned to these cities, no trace of which now remains; the majority holding

that they stood on the southern shore of the Dead Sea, near the salt hill of Usdum; while others, again, apparently with more countenance from the Scripture narrative (Gen. xiii. 10—13), maintain that Sodom, Gomorrah, and the other 'cities of the plain,' stood in the 'circle or plain of the Jordan,' east from Bethel and Ai, near where the river discharges itself into the Dead Sea. The popular belief, that the cities were miraculously overwhelmed by the waters of the Dead Sea, and that their remains may still be seen at the bottom, is an idle tale of superstitious travellers, uncountenanced either by fact or by the terms employed by Scripture to describe the catastrophe.

SODOM, APPLE OF, the name given to the fruit of a species of *Solanum* (q. v.). But it seems that the true APPLE OF SODOM, or MAD APPLE, of the shores of the Dead Sea, mentioned by Strabo, Tacitus, and Josephus, and described as beautiful to the eye, but filling the mouth with bitter ashes if tasted, is a kind of gall, growing on dwarf oaks, and produced by a species of gall-insect, which has received the name of *Cynips insana.* These galls are about 2 inches long, and 1¼ inch in diameter, of a beautiful, rich, glossy, purplish-red colour, and filled with an intensely bitter, porous, and easily pulverised substance, surrounding the insect. They are attached to the twigs in a curious manner, different from other galls, the narrow end 'rising upwards on each side, and bending inwards, so as to clasp the extremity of the twig somewhat like a pair of wide and curved nippers.'

SODOMY, an unnatural crime, is punishable with penal servitude for life, or any term not less than ten years, and the attempt to commit it is punishable with penal servitude from three to ten years. In Scotland it is still nominally a capital offence, but never punished except by penal servitude and imprisonment.

SODOR AND MAN, BISHOPRIC OF. See HEBRIDES.

SOEST (pronounced SOHST), a town of Prussia, province of Westphalia, 36 miles south-east of Münster by railway, was, during the middle ages, a Hanse-town and fortress, and, in point of commercial importance, one of the foremost cities of Germany, with a pop. of from 60,000 to 70,000. Now, however, it is only the shadow of its former self; but relics of its ancient splendours still survive in its numerous and magnificent churches, of which the finest is the 'Meadow Church,' restored in 1850. Its municipal law, the *Jus Susatense*, was the oldest in Germany, and served as the model for the other imperial free-towns, Lübeck, Hamburg, &c. At present, S. has some trade in corn, and extensive breweries. Pop. (1862) 10,501.

SOFA'LA, or, as the old geographers sometimes wrote it, CEFOLA, is the name given rather indefinitely to that portion of the south-east coast of Africa extending from the Delta of the Zambezi (Quama of old geographers) as far south as the Rio Maneci or Delagoa Bay, or from lat. 18° to 26° S., although some modern geographers consider Cape Corrientes as its southern limit. This stretch of coast now comprehends the Portuguese captaincies of Rio de Senna, Tetè, Sofala, and Imhambane, besides the regions round Delagoa Bay, nominally under the control of the crown of Portugal, the extent inland being generally limited by the mountain region which runs parallel to the coast of Southern Africa, and forming a belt of low country about 150 miles wide, full of swamps, densely wooded, and generally unfavourable to European life.

S., in common with the remainder of the coast of Eastern Africa, was conquered by the Arabs between the 8th and 12th c.; it was visited in 1480 by Pedrao Cavalho, a Portuguese captain, from Abyssinia, before the route by sea to India was discovered. In 1500, the Portuguese, under Albuquerque, commenced making settlements on this coast, and built a strong fort on an island in the mouth of the Rio de Sofala, near a town which was founded 200 years before by the Arabs, and which still exists, although in a very decayed state. The inland region at the back of the coast district, now occupied by the Transvaal Boers towards the south, or by Moselikatse and his Amatabele to the north, and stretching away northward for an indefinite distance, formed the celebrated though mythical empire of Monomotapa, the accounts of which by the early travellers are perfectly marvellous. S. was considered by the old geographers as a very rich, gold-producing country, and was judged by some to be the Golden Ophir to which King Solomon every three years sent a fleet of ships; and, indeed, it seems to have derived its name from the Greek *Sophira*, by which Ophir is translated in the Septuagint. Lopez tells us that in his time the inhabitants related that the gold-mines of S. afford yearly two millions of metrigals—every metrigal accounted for a ducat. Whatever may have been its former reputation, S. has long ceased to be a gold-producing country to any considerable extent.

An old writer says: 'Great wild elephants overspread the country, which the natives neither know how to tame nor manage; nor are lions, bears, stags, or harts and boars fewer; besides, sea-horses sport themselves in the Quama.' This description is pretty accurate, even at the present day, if we omit the bears, and call the stags antelopes; for the elephants, rhinoceroses, and other large game, driven away from the highlands in the interior by the pursuit of the Cape hunters, have descended into the coast lowlands, where the dense bushy nature of the country, and its extreme unhealthiness, protect them from extermination, although such keen sportsmen as M'Cabe, Chapman, and Edwards have not feared to follow them there.

The most northern regions of S. are the captaincies of Rio de Senna and Tetè, formerly called Matuka, which include the country on the right bank of the Zambezi, sloping down from the Malappo Mountains, which bound its basin on the south. The principal places are Tetè, in lat. 16° 12′ S., long. 31° 50′ E.; and Senna, in lat. 17° 30′, long. 34° 40′. The middle region comprises the captaincy of S., the seat of government being at the town or fort of that name, in the Bay of Massangane; lat. 20° 12′, long. 34° 40′. Imhambane is the name of the most southerly captaincy, in lat. 23° 51′, and long. 35° 20′. There are other inconsiderable Portuguese factories along the coast at Imhampoora, south of Imhambane, Mambone, and Lorenco Marquez, in Delagoa Bay, where a Portuguese governor resides.

Although nominally under Portuguese rule, yet the authority of that government rarely extends outside of the walls of the miserable forts held by its agents. It is computed that on the whole of the Portuguese settlements on the east coast of Africa there are not more than 500 colonists of European birth. Trading-parties of Dutch Boers from the Transvaal Republic occasionally visit the factories at Imhambane, Sofala, and Lorenco Marquez, to purchase articles of European manufacture in exchange for ivory, wax, timber, &c. The natives, generally, are of the negro type, gradually approximating to the more intellectual Zulu Kaffir as we proceed from the Zambezi to Delagoa Bay.

The principal exports from this region are ivory, bees-wax, hides, and rhinoceroses' horns; while a considerable clandestine trafficois said to be carried on in slaves. Considerable amounts of gunpowder, lead, coffee, and European clothes find their way up from the coast to the Boer settlements in the highlands of the interior. The coast-line is generally low and sandy, and dangerous on account of shoals and sandbanks. A group of islands, called Bazaruta, lie off the coast north of Cape St Sebastian, in lat. 22° S. The best harbour is that of Imhambane, and ships may ascend to the town, about 8 miles from the mouth of the river. The harbour at the mouth of the Rio de Sofala is difficult of access on account of its bar.

SOFFIT, a small ceiling, formed into panels, as over windows, ingoings of doors, staircases, &c.

SOFTENING AND INDURATION are terms used to express a pathological diminution and augmentation of the consistence of the tissues or organs of the body. These changes may arise from inflammatory action; but softening may also be induced by causes totally distinct from inflammation, as, for example, from a deficient supply of blood, from scrofula or cancer, or from long-continued functional inactivity (as in the case of paralysed muscles). Amongst the parts liable to both softening and induration are the brain and spinal cord, the heart, the lungs, the serous and mucous membranes, the liver, the spleen, the kidneys, the uterus, and the bones and cartilages.—For further details on the subject, the reader may consult the English translation of Vogel's *Pathological Anatomy.*

SOFT-GRASS (*Holcus*), a genus of grasses having a lax panicle, two-flowered spikelets, with two nearly equal glumes. The species are not numerous. The English name is derived from the soft and abundant pubescence of the British species, which are two in number, CREEPING S. (*H. mollis*), and WOOLLY S. or MEADOW S. (*H. lanatus*), both perennial grasses, and both very common. Meadow S. is found most abundantly on damp, moorish, or peaty soils, on which it is sometimes sown, as it yields abundant herbage; but it is very inferior to some other grasses, and therefore unsuitable for rich meadows and pastures. Creeping S. is generally found on dry, sandy, or other light soils; and very much resembles Meadow S., but is still more downy, and of smaller size. The roots sometimes extend 5 or 6 feet in a season. The roots contain much nutritious matter, and are a very acceptable food to horses and cattle, but especially to hogs, which grub them up for themselves when they have opportunity.

SOIGNIES, a town of Belgium, province of Hainault, 22 miles south-west of Brussels by railway. Its church of St Vincent Maldegaire, founded in the 10th c., if not earlier, is probably the oldest in Belgium. S. has breweries, distilleries, trade in stone and lime, and large fairs. Pop. 6634.—Some miles to the north-east, in the province of South Brabant, lies the forest of S., at whose southern extremity is situated the famous field of Waterloo.

SOILS consist of the disintegrated materials of the hard crust of the earth, mixed with decayed vegetable matter. This disintegration is effected partly by the chemical action of oxygen, carbonic acid, and the other acid or alkaline substances brought by the atmosphere to bear upon rocks, and partly by the wearing action of water in a fluid state or in the form of glaciers, or by its bursting force when frozen in deep clefts. The soils produced by running water, floods, and tides, are found along the banks or at the mouths of rivers, and are generally called *alluvial soils;* those produced by glacier-action are known as *drift soils;* and both are generally found at a great distance from the rocks of whose disintegrated materials they are composed. But by far the greater mass of soil has been produced in the other way above mentioned, by the gradual weathering of rock under atmospheric influence; and it is generally found adjoining or overlying the rocks from which it has been produced. Immediately beneath the soil or stratum of earth which affords nourishment to plants, is a mass of earth or rock, unmixed with decayed vegetable matter, to which the term *subsoil* is applied. The subsoil may or may not be similar in its geological constitution to the soil; and from the absence of vegetable matter, is generally lighter in colour than the latter.

Every species of rock has produced its soil; but the older formations, from their greater hardness and power of resistance to atmospheric action, produce, in proportion to their exposed surface, less soil than do the Secondary and Tertiary groups. The fertility of soils has no relation to the chronological succession of the strata of the earth's crust; thus, igneous rocks produce a naturally fertile soil, though they seldom become thoroughly disintegrated; metamorphic or transition rocks furnish one of poor quality, as does also the greater portion of the Silurian system; while to the vast mass of the Secondary group of deposits, especially the Devonian system, with its old red sandstone, and limestone, and marl beds, the mountain limestone of the Carboniferous system, and the new red sandstone of the Permian and Triassic systems, belong some of the richest tracts in Great Britain, though numerous members of the same group supply barren and ungrateful soils. The Lias, and Oolitic, and Wealden systems generally supply clay-soils of considerable fertility, but of the densest texture and most intractable character; soils formed from the cretaceous group are extremely variable in quality; but when the chalk is largely mixed with sand or clay, they exhibit a considerable degree of fertility; however, they have one great general defect, that of not sufficiently retaining moisture. The soils produced from the Tertiary formations possess no general characteristics, being sometimes extremely fertile, and again almost wholly barren; and, in short, we are bound to come to the conclusion, that the mere geological composition of soils affords no very reliable criterion by which their economic value can be estimated; the same rock which produces the almost barren soil of Argyleshire, weathers into the fertile soil of the Channel Islands; and to the old red sandstone is due at once the rich soil of Hereford, Monmouth, Moray, and Strathmore, and some of the most barren heaths and moors in Scotland. These apparent anomalies are no doubt largely produced by the various action of heat, moisture, and other meteorological agencies.

But however soils may vary in a geological point of view, they are all resolvable into a few elements —viz., the various compounds of aluminium, iron, manganese, the four alkaline metals, the seven alkaline earths, and the four organic elementary substances. These 18 bodies supply, singly or in combination, all the constituents necessary to the growth of plants, each of them having its own portion of the plant to sustain—the silica producing strength and rigidity in the stems; alumina giving tenacity to the soil, and so rendering it a stable support; magnesia perfecting the seeds; iron absorbing oxygen and ammonia from the atmosphere, and giving it up as required; and so on. Of these ingredients, silica, alumina, lime, along with matter derived from organic bodies, constitute the bulk of the soil; the other ingredients existing only

in minute quantity, and hence is derived the common quadruple division of soils into *silicious or sandy, argillaceous or clayey, calcareous*, and *humous*.

It is not sufficient that soil possesses all the ingredients necessary for rendering it fertile, or that these ingredients are in a sufficiently comminuted state to enable them to be absorbed; there is besides a certain physical or mechanical condition necessary. Thus, for example, a soil which possesses too great a proportion of silica, is too little retentive of moisture, and has not sufficient consistency of texture to be an effective support of tall plants; one in which calcareous matter abounds is also too dry a soil; while if alumina predominates, it is generally too retentive of moisture; and a great excess of the last-named ingredient renders it so extremely tenacious, as to be almost incapable of reduction to a proper mechanical state. The soil which is physically most perfect is composed of about equal proportions of the two great ingredients, silica and alumina, and is generally known as *loam*, being distinguished into *clay loam* or *sandy loam*, according as the alumina or silica sensibly predominates. But the physical qualities of soils do not wholly depend upon their composition; they are also largely affected by the depth of the soil itself, and the quality of the subsoil. Should the soil and subsoil be both retentive, or both porous, the defects of these states as to dryness or moisture are considerably increased; if porous and retentive soils of good depth rest upon subsoils of a contrary character, the defects of the former are to a considerable degree amended. But the advantages and disadvantages of these conditions must to a very large extent be judged by the prevalent character of the climate, a somewhat porous subsoil in a cold moist district being generally preferable, and *vice versâ*. Each of these classes of soils, when possessed of the chemical ingredients in quantity sufficient for the wants of plants, and of a texture favourable to their growth, excels in the production of certain species. Thus, the clay loams are unequalled for the production of wheat and beans; the sandy loams for barley, rye, and the various root-crops; while both are well suited for the growth of the other cultivated plants, or for perennial pasture.

Besides the calcareous and marly soils which may be, according to circumstances, classed as a clayey or sandy soil, rarely the former, there is the humous soil, which possesses characteristics peculiarly its own. It is not devoid of consistency like the sandy, or retentive of moisture like the clayey soils, but in its natural state is spongy and elastic in texture, of a remarkably dark colour, and when dried, becomes inflammable, and even when much improved by culture, retains these characteristics in a considerable degree. It consists wholly, or to a great extent, of vegetable matter, and is found in perfection in forests of ancient date, as the woods of America, and in the peculiar form of Peat (q. v.) in many parts of the world. In its ordinarily decomposed condition, it is at once the richest of soils; but in the state of peat it calls for long-continued drainage, and the application of decomposing agents, before it can be rendered of service in the production of crops.

Improvement of a soil must, then, as is seen from the foregoing considerations, be effected either by supplying the substances required by plants to a soil which is deficient in them, by altering its depth and texture, and by removing excess, or supplying deficiency of moisture. The first of these objects is effected by the introduction and incorporation of Manures (q. v.) with the soil, care being taken that the manure contains the requisite ingredients, and in such a condition as to be assimilable by plants either directly or indirectly through the soil, and by the more thorough exposure of the soil to the action of the atmosphere; the second is effected by the admixture of marl or clay with sandy, chalky, or peat soils, of lime, ashes, or burned clay, with tenacious clay soils, or by the mixture of the subsoil (if differing in quality) with the soil by means of the subsoil plough, or by more complete surface-tillage, and free exposure to the action of frost; and the third is accomplished by Drainage (q. v.) and Irrigation (q. v.). The fertility and chemical composition of a soil may be approximately determined by inspection of its colour and texture; but more accurately, as well as its dryness or moisture, excess or defect of silica and alumina, by the predominance of certain species of wild plants or weeds.

SOISSO'NS, a town of France, in the dep. of Aisne, stands in a fertile vale on the banks of the river Aisne, about 65 miles north-east of Paris. S. is the key of Paris for an army invading France from the Netherlands, and is the meeting-point of six military roads. The principal building is the cathedral, founded in the 12th c., the library of which contains many rare MSS. There are also some remains of the great castellated abbey of St Jean des Vignes, where Thomas à Becket found refuge when in exile. Quite near to S. is an institute for 'deaf and dumb,' which occupies the site of the famous abbey of St Médard, where Clothaire and Siegbert were buried. S. has manufactures of linen, woollens, and cottons. Pop. (1862) 8393. S. is one of the oldest towns in France, and was celebrated even in the time of the Romans, when it bore the names first of *Noviodunum*, and afterwards of *Augusta Suessionum*; hence its modern name of Soissons. It was the last Roman stronghold in Gaul that withstood the arms of Clovis, who here overthrew Syagrius, the Roman commander, in 486, and made it the seat of the Frankish monarchy, which it long continued to be.

SÓKOTO, a kingdom of Africa, in Sudan, to the south-west of Lake Tchad, and separated from it by the state of Bornu (q. v.). Area, 117,180 sq. miles. The inhabitants, who are mostly of the Fulbe tribe, are numerous. A formidable military force is maintained.—*Sókoto*, the capital, stands on the Zirmie, an affluent of the Sókoto, which flows into the Quorra. Its market is of great importance; it trades in raw silk, glass-wares, and perfumery, carries on extensive and famous manufactures of leather goods, and has from 20,000 to 22,000 inhabitants.

SOLANACEÆ, or SOLANEÆ, a natural order of exogenous plants, mostly herbaceous plants and shrubs, but including a few tropical trees. The leaves are mostly alternate, undivided, or lobed, without stipules. The flowers are regular, or nearly so; the calyx and corolla generally 5-cleft; the stamens generally five. The fruit is either a capsule or a berry, mostly 2-celled. The plants of this order are mostly natives of tropical countries, a small number extending into the temperate and moderately cold climates of both hemispheres; in the coldest regions they are entirely awanting. They are mostly distinguished by an offensive smell, and by containing in greater or less abundance a narcotic, poisonous substance, usually associated with a pungent principle, and some of them are amongst the most active poisons. Sometimes the narcotic substance predominates, as in Mandrake (q. v.) and Henbane (q. v.); sometimes the pungent substance predominates, or is alone present, as in Cayenne Pepper (*Capsicum*); sometimes both are present in more or less equal proportion.

as in Tobacco, Thorn-apple or Stramonium, and Belladonna. The fruit is generally poisonous; but that of a considerable number of species, in which acids and mucilage predominate, is eatable, as, for example, the berries of the Winter Cherry and other species of Physalis, those of the Egg-plant (q. v.) and some other species of *Solanum*, and of the Love-apple (*Lycopersicum*). The tubers, which occur in a few species, contain much starch, and serve as an article of food, of which the Potato is the chief example. The seeds of all contain a fixed oil, which in the south of Germany is expressed from the seeds of the Belladonna itself.

SOLAN GOOSE. See GANNET.

SOLA'NO. See SIMOOM.

SOLA'NUM, a genus of plants of the natural order *Solanaceæ*, containing a great number of species, which are distributed all over the world, but are particularly abundant in South America and the West Indies. Some of the species are herbaceous, others are shrubs; some of them unarmed, and some of them spiny; many covered with a down of starlike hairs. The flowers are in false umbels, or almost in panicles; seldom in racemes, or solitary. The anthers open by two holes at the top. The berries are two-celled, and contain many smooth seeds. The species of this genus almost always contain in all their parts a poisonous alkaloid, *Solanine*, in greater or less quantity, sometimes so much that the leaves or the berries cannot be eaten without danger, whilst in a few species the quantity present is so small as to be insignificant, and these parts are eaten freely, being agreeable and harmless. By far the most important of all the species is *S. tuberosum*, the POTATO (q. v.), in which, however, Solanine is found in considerable quantity, so that not only the herbage, but the juice of the raw tubers, is unwholesome. Of the species with eatable fruit, the principal is *S. melongena*, the EGG-PLANT (q. v.). —The only British species are *S. dulcamara*, the BITTERSWEET (q. v.), and *S. nigrum*, the COMMON NIGHTSHADE (q. v.), both of which possess poisonous and medicinal qualities. The berries, leaves, bark, and roots of various species are employed for different medicinal uses in the warm countries of which they are natives; but their properties have not yet been sufficiently investigated. The berries of *S. saponaceum* are used as a substitute for soap.

SOLAR, an upper chamber or loft. The only private apartment in the old baronial halls was so called. It was placed over the pantry, at one end of the hall, and served as parlour and sleeping apartment for the baron and his family.

SOLAR CYCLE. See PERIOD.

SOLAR MICROSCOPE, an instrument for producing magnified images of minute objects on a screen, through the agency of the sun's rays. The tube of the microscope is conical, and is fastened to the interior side of a closed window-shutter over a hole in the latter; a reflector, placed at the hole so that the rays of light may fall on it, is so adjusted as to throw them along the tube. They are then collected by a powerful double convex lens, and thrown on the object, which is inserted into the tube at the focus of the lens by a slit at the side. After passing the object, the rays again pass through a single lens, or a combination of lenses, make their exit from the tube, and fall on a screen, on which they depict a magnified image of the object. We have here supposed the object to be so translucent as to allow of the passage of rays through it. Should it be opaque, the rays of light reflected from the mirror are caught by the double convex lens, which concentrates them on another mirror near the opposite end of the tube; they are thence reflected upon the back of the object, and diverge on the system of lenses at the mouth, which form the image. Instead of the sun's rays, the oxy-hydrogen lime-light (and more recently the electric light) has been employed, its rays being thrown on the double-convex condenser by means of a concave reflector, in whose focus the piece of burning lime or marble is situated. The instrument is hence often called the *Oxyhydrogen Microscope*.

SOLAR SYSTEM. The planets and comets which circle round the sun combine with it to form a system to which is given the name of *solar* or *planetary* system. It is probable that each star is the centre of an analogous system. This, however, is merely a matter of speculation, and in no way practically concerns us; but it is different with the solar system. No change of much magnitude can take place in the elements of the planets without having effect on the earth and its inhabitants, on account of the mutual attractions of the planets for each other; in fact, they appear as members of one isolated family, bound together by common ties, which could not be ruptured in the case of one individual without communicating a general shock to the others. The various members of the solar system are noticed under PLANETS, PLANETOIDS, COMET, SUN, MOON, SATELLITES; and their motions are treated of under GRAVITATION, CENTRAL FORCES, PRECESSION, &c., so that it only remains here to give the more interesting numerical facts connected with them, which can be done most conveniently in a tabular form.

Name.	Equatorial Diameter in Eng. Miles.	Density: Earth's being 1.	† Distance from Sun in Eng. Miles.	Period of Orbital Revolution in Days.	Inclination of Orbit to Ecliptic.	Period of Sidereal Revolution on Axis. Hrs.	Min.
Mercury,	3,154	1·20	36,770,000	88	7° 0′ 9″	24	5
Venus,	7,727	·92	68,700,000	225	3° 23′ 28″	23	21
Earth,	7,925	1·00	† 95,000,000	365	0° 0′ 0″	23	56
Mars,	4,097	·95	144,750,000	687	1° 51′ 6″	24	37
Eighty-five Planetoids* (average),			254,460,000	1,595			
Jupiter,	86,065	·24	494,270,000	4,333	1° 18′ 51″	9	55
Saturn,	79,147	·12	906,200,000	10,759	2° 29′ 36″	10	16
Uranus,	34,83'	·17	1,822,360,000	30,687	0° 46′ 28″		
Neptune,	37,398 ?	·17 ?	2,853,800,000	60,126	1° 46′ 59″		
Sun,	882,000 †	·25				607	48
Moon,	2,153	·62			5° 8′ 39″	655	43

* The 82d Planetoid (Alcmena) was discovered by Luther at Bilk, Nov. 27, 1864; the 83d (Beatrice) by De Gasparis at Naples, May 3, 1865; the 84th (Clio) by Luther at Bilk, Aug. 25, 1865; and the 85th by Peters at Clinton, New York, Sept. 19, 1865.

† Recent investigations make the sun's distance 91,600,000; and the sun's diameter, the planetary distances, &c., will therefore require a proportionate reduction.

SOLA'TIUM, in Scotch Law, means compensation for wounded feelings, and is something over and above the ordinary pecuniary value of the damage. In England, such a ground of damages is not in strict principle admitted, but in practice there is no substantial difference.

SOLDER, an easily fusible alloy used for joining metals. Solders are of various kinds, suited to different metals. They always require to be used with a flux, such as borax, resin, chloride of zinc, sal-ammoniac, &c. The following are the principal solders: *Pewterers' solder*—bismuth, 2 parts; lead, 4 parts; tin, 3 parts. This can be used for coarse work by the direct application of naked fire; but for fine work, requiring the protection of a muffle-furnace, the composition must be bismuth and lead, of each one part; tin, 2 parts. *Plumbers' solder* for coarse work—tin, 1 part; lead, 3 parts. For finer work—tin, 2 parts; lead, 1 part. *Spelter solder*—12 parts zinc to 16 parts of copper. *Soft spelter solder*—equal parts of copper and zinc. When solders are applied in the common work of plumbers and tinmen, a tool called the soldering-iron is used: this is made red-hot, and forms a convenient means of applying fire direct to the solder and flux. Although called the soldering-iron, the portion of the tool to be heated must be of copper. In many manufactures, a flame produced by a mixture of atmospheric air and coal gas is used to melt the solder; and for fine work, such as jewellery, the common blowpipe is often used.

SOLDIER is one who enters into an obligation to some chieftain or government to devote for a specified period his whole energies, and even if necessary his life itself, to the furtherance of the policy of that chief or government. The consideration may be immediate pay, or prospective reward: or the contract may be merely an act of loyal devotion. The acknowledgment of the service by the employer constitutes the man a recognised soldier, and empowers him to take life in open warfare, without being liable to the penalties of an assassin and a robber. The fact of being mercenary, that is, of receiving wages for killing and being killed, does not render a soldier's trade less honourable. He bears arms that others may be able to do without them: he is precluded by the exigences of military training from maintaining himself by peaceful occupation; and it is therefore but fair that those whom he protects should support him, and give him, over and above actual maintenance, reasonable wages for the continual risk of his life. If a man willingly enlist himself as a soldier in what he believes to be an unrighteous cause, it is an act of moral turpitude; but when once enlisted, the soldier ceases to be morally responsible for the justice or iniquity of the war he wages; that rests with his employer. Obedience, implicit and entire, is his sole virtue. The maxim is: 'The military force never deliberates, but always obeys.' See ENLISTMENT, MARTIAL LAW, WAR, &c.

SOLDO. See SOLIDUS.

SOLE (*Solea*), a genus of Flat-fishes (*Pleuronectidæ*), of an oblong form, with a rounded muzzle, which almost always advances beyond the mouth; the mouth twisted to the side opposite to that on which the eyes are situated, which is usually the right side, although individuals of the same species are found having the eyes and colour on the left side; the teeth very small, in both jaws, but only in the under part of the mouth (the *side* opposite to the eyes); the lateral line straight; pectoral fins on both sides; the dorsal and anal fins long, and extending to the tail, but distinct from the tail-fin. —The COMMON S. (*S. vulgaris*) is a highly esteemed fish, abundant on the British coasts where the bottom is sandy, and of which great quantities are brought to market. The London market is supplied chiefly from the south coast of England, the soles there attaining a larger size than those of more northern coasts. They are caught by trawling, very seldom with bait. The S. is in condition for the table during the whole year except five or six weeks in February and March, its spawning-time. The Common S. is found on all the coasts of Europe, except the most northern. It has been known to attain a size of 26 inches long, and almost 12 inches broad, weighing 9 pounds; but a S. of less than half that weight is reckoned very large. The upper



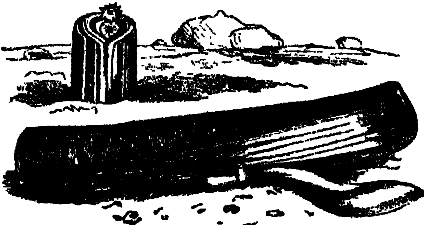
Common Sole (*Solea vulgaris*).

side of the body is of an almost uniform dark brown; the scales small, rough to the touch, and ciliated at the edge; the lower side is white. The S. sometimes ascends rivers to a considerable distance from the sea, and seems to thrive at least as well in fresh as in salt water, a fact of which advantage has not yet been taken for the stocking of fresh-water ponds. It breeds freely enough in fresh water.—The only other British species of true S. is the LEMON S. (*S. pegusa*), which is sometimes taken with the Common S. on the south coast of England, and more rarely in more northern parts. It is paler in colour than the Common S., and broader and thicker in proportion. It is equally esteemed for the table.—The name S. is popularly extended to several genera recently separated from the true soles. In *Brachirus*, the dorsal and anal fins are united with the tail fin; but, as in *Solea*, there are pectorals on both sides. To this genus belongs the ZEBRA S. (*B. zebrinus*) of Japan, remarkable for the zebra-like stripes which cross its whole body.—In *Monochirus*, the pectoral fin is developed only on the upper side. To this genus belong the VARIEGATED S. (*M. variegatus*) and the LITTLE S. or SOLENETTE (*M. linguatulus*), both found on the British coasts, but of little importance, on account of their small size.—In the genera *Achirus* and *Plagusia*, of which there are no British species, the pectorals are wanting on both sides.

SO'LECISM. A solecism is the term applied to any violation of the grammar or idiom of a language, or of the usages of society. It is said to be derived from the city of Soli in Cilicia, whose inhabitants spoke very bad Greek, in consequence of their intercourse with the Cilician natives, and provoked the fastidious Athenians to coin the epithet.

SO'LEN, a genus of lamellibranchiate molluscs, the type of a family, *Solenidæ*, remarkable for the wide gaping of the shell at both ends, and the large and muscular *foot*. In the genus S., the shell is remarkably elongated, its apparent length being, however, more strictly its breadth. From its form, the names RAZOR-SHELL and RAZOR-FISH are often given to it. The species are numerous, and inhabit the sands of all seas except in the coldest parts of the world. Some of the tropical species have shells of great beauty. The solens burrow in sand, making their hole straight down, and ascending and

descending by means of their foot, which is capable of being elongated and contracted to bore a passage for the animal, and to drag it through. They are used for food, and also by fishermen for bait. To obtain them, a hooked iron implement is used. Another



Solen, or Razor-fish (*S. siliqua*).

method is to drop a quantity of salt on the mouth of the hole, which causes them to come up, when they are quickly seized. The most common, and one of the largest British species, *S. siliqua*, is about an inch in *length*, and eight inches in breadth. It is perfectly straight. Another common British species, *S. ensis*, is curved like a sword.

SOLENHOFEN LITHOGRAPHIC STONE, a famous deposit of limestone of Upper Oolite age, which from its fine-grained and homogeneous texture is admirably adapted for lithographic purposes. It occurs near Aichstadt in Bavaria, and has been extensively quarried since the invention of lithography. The quarrymen work upon the lines of stratification, which are beautifully parallel, and all the fossils are found upon the natural surfaces of the beds, and present an impression and cast in



Remains of Archæopteryx in Solenhofen Stone.

almost every instance. The rock is quarried to a depth of 80 or 90 feet. It is of special interest to the geologist from the singular assemblage of fossil remains which are preserved in it with wonderful minuteness. The most delicate tracery of the wings of the dragon-fly is often as perfect as in living specimens. The rock is of marine origin, and while lithologically it has a strong resemblance to the White Lias of Britain, its fossils correlate it to the Kimmeridge Clay. These are chiefly ammonites, nautili, crustacea, winged insects, fishes, and pterodactyles. But the most singular fossil is one which has only recently been brought to light. A single feather was first found, and some months after, the bones of a feather-covered animal, which was considered by its first describers to be a lizard, but Professor Owen has recently shewn, on incontrovertible grounds, that it is a true though very anomalous bird. The specimen which, with the exception of the head, is almost entire, is now in the British Museum. It has formed the subject of an elaborate memoir by Professor Owen, published in the *Philosophical Transactions*. He has named it *Archæopteryx macrura*. It is certainly the oldest bird of which any remains have yet been found, but the rocks which contain the numerous ornithic footprints in Connecticut Valley (see ICHNOLOGY) are more ancient; the most careful examination has, however, hitherto failed to discover in them any indications other than the footprints. The *Archæopteryx* was about the size of a rook. The anomalous structure which induced the earlier observers to make it a reptile, and some that followed to imagine it as a transition form between the reptile and the bird, is the tail, which, instead of consisting of a few shortened vertebræ united together into a coccygean bone, as in all known birds, recent or fossil, was formed of twenty elongated vertebræ, each of which supported a pair of quill-feathers. But this departure from the bird type is not so anomalous as it at first sight appears, for in the early embryonic condition of the bird, the vertebræ are distinct and separate, and the anastomosis which invariably takes place in the subsequent development of the embryo, does not occur in the *Archæopteryx*, so that it may be considered to exhibit the temporary embryonic condition of the bird as a permanent structure; and that this is the true position of this singular fossil is further established by the existence of other features which are found only in birds. These are the ornithic structure of the wings and legs, the occurrence of feathers, which are confined to birds, and the existence of a merry-thought (furculum), which is found in no other class of animals. An elevation on the surface of the slab containing the fossil is believed by many to be the cast of the interior of the skull, and it corresponds remarkably in size and form with the cast from the skull of a rook.

SO'LENT, the name of the western portion of the strait that intervenes between the Isle of Wight and the mainland of England. At Hurst Castle, which guards its entrance on the south-west, the S. is less than a mile in breadth; and along this narrow passage the tide flows with a rapidity which at certain times no boat can stem. The castle itself consists of a central tower or keep, surrounded by several smaller towers, and mounted with heavy guns.

SOLEU'RE (Ger. *Solothurn*), a canton in the north of Switzerland, bounded on the W. and S. by Bern, and on the N. and E. by Basel and Aargau. Area, 288 sq. m.; pop. (1860) 69,263, mostly Roman Catholics. The greater portion of the canton is fertile and well cultivated, especially along the banks of the Aar. Even the rugged and hilly districts are sources of wealth on account of their fine pasturage. Besides grain, the principal products of S. are fruit, wine, flax, and cotton.

Cherry-brandy is a very important article of trade. The manufacture of iron, glass, pottery, hosiery, and recently of watches, is carried on to a considerable extent.—S. entered the Swiss Confederation in 1481 along with Freiburg. Its constitution is liberal. The legislative body, or parliament, is the Grand Council, consisting of 105 members, of whom 55 are directly chosen by the people, 41 indirectly, and 9 by the Grand Council itself. The executive, or council of government, is under the presidency of a landamman.

SOLEURE (Ger. *Solothurn*), capital of the canton, is situated on the Aar, 16 miles north-north-east of Bern by railway. The scenery in its vicinity is among the loveliest in Switzerland. The Aar flows through the town, dividing it into two unequal parts, which are connected by two wooden bridges. The most notable building is the cathedral of St Ursinus, with a cupola and façade of Corinthian columns, reckoned the most costly cathedral in Switzerland. S. has some manufactures, but derives its chief industrial importance from its transit-trade. Pop. 5370.—Near to S. are the baths of Weissenstein.

SOLFATA'RA (Fr. *Soufrière*, Ger. *Schwefelgrube* or *Schwefelsee*), the Italian name for such volcanoes as, having become less active than volcanoes in an actual state of eruption, only exhale gases. The most notable of them are found in Italy, in the Antilles, in the interior of Asia, and in Java. The S. of Pozzuoli, near Naples, is an irregular plain, 1368 feet long, and 1310 feet broad, almost surrounded by broken hills of pumaceous tufa, the ancient walls of the crater. From the crevices of the rocks, steam or noxious gases, chiefly sulphuretted hydrogen, mixed with a minute quantity of muriatic acid and muriate of ammonia, exhale. In the cracks and fissures of the rocks, sulphur, alum, and sulphate of iron abound. The vapours exhaled are used as medicinal baths, and huts, constructed of boards, have been erected in which the baths may be obtained. The Soufrière of Morne-Garou, in the isle of St Vincent, Lesser Antilles, about three miles in circuit, and over 500 feet in depth, has in its centre a cone, the summit of which is covered with sulphur.

SOLFE'GGIO, in Music, seven syllables, which are sometimes used as a nomenclature for the seven notes of the scale. In singing, the art of applying these syllables to the notes as an exercise for the learner, is called *Solmisation*. The syllables are *ut* (or *do*), *re*, *mi*, *fa*, *sol*, *la*, and *si*. The first six are the commencement of the lines of an ancient monkish hymn to John the Baptist, which had this peculiarity, that the first syllable of each line was sung to a note one degree higher than the first syllable of the line that preceded, so as to present the type of a scale:

Ut que-ant lax - is *Re* - so - na - re fi - bris

Mi - ra ges - to - rum *Fa* - mu - li tu - o - rum

Sol - ve pol - lu - ti *La* - bi - i re - a - tum

Sanc - te Jo - han - nes.

These syllables are said to have been first made use of by Guido of Arezzo, in the 11th c.; and Le Maire, a French musician of the 17th c., added to them *si*, for the seventh of the scale. When applied to the key of C, their equivalents, in the ordinary musical nomenclature, are:

Do	re	mi	fa	sol	la	si	do
C	D	E	F	G	A	B	C.

These syllables may, however, according to the more modern practice of teachers in this country, be applied to other keys, with *do* always as the keynote, so as to express not the absolute pitch of a note, but its relation to the keynote; and thus used, they are thought to be of service to the learner in keeping prominently before him the principle that there is but one scale in music, which is raised or lowered according to the pitch of the key. Different variations in the way of using the syllables have recently given rise to various supposed short and easy modes of teaching singing, the best-known of which is Mr Curwen's system of 'Tonic Solmisation,' where the ordinary notation of the staff, with its lines and spaces, is entirely rejected, and a notation substituted which is formed of the solfeggio syllables, used to express not pitch but relation to the keynote. One disadvantage of this and similar schemes is the entire withdrawal of the direct indication of the pitch of the sounds to the eye, by the notes ascending as the sounds ascend, which is so beautiful a feature of the common notation. And even if it be granted that the first rudiments of music can, as has been asserted, be taken up with remarkable ease by the pupil who learns on the tonic sol-fa system, it is undeniable that as soon as he comes in contact with notes of different lengths, or begins to modulate from one key to another, he is beset with serious difficulties. There is, in addition, the further objection to the system, that the pupil thus taught is shut out from the whole world of musical literature, a disadvantage which is not compensated by having a few elementary difficulties smoothed away, which experience shews that children of the most mediocre capacity can overcome.

SOLFERI'NO, a village of Northern Italy, province of Brescia, 20 miles north-west of Mantua, with 1400 inhabitants. It stands on a hill, and has a tower called the Spy of Italy (*Spia d'Italia*), from which the whole plain of Lombardy may be seen. There, in 1796, the French conquered the Austrians. On June 24, 1859, S. was again the scene of an overwhelming victory obtained by the French and Italians over the Austrians.

SOLICITOR. See ATTORNEYS.

SOLICITOR-GENERAL, the name given to one of the law-officers of the crown. The Solicitor-general of England has powers similar to those of the Attorney-general (q. v.), to whom he gives aid in discharging his functions. During the absence of the Attorney-general, he may do every act and execute every authority of that officer. He is, *ex officio*, one of the Commissioners of Patents.

The Solicitor-general of Scotland is one of the crown counsel, next in dignity to the Lord Advocate (see ADVOCATE, LORD), and exercising all his functions along with him. His office cannot be traced further back than the Union. Like the Lord Advocate, he has the privilege of pleading within the bar. All proclamations for the observance of days of public fasting and thanksgiving are addressed to the Solicitor-general.

SOLICITOR TO THE TREASURY, an officer who acts as attorney for the government in all legal proceedings. He has also to act as solicitor for

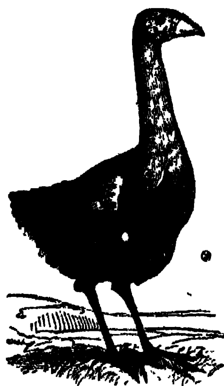
the three secretaries of state, the Privy Council Office, the Board of Trade, the Mint, the War Office, the Stationery Office, and for all the other principal departments for which no solicitor is specially appointed.

SOLIDUNGULA. See EQUIDÆ.

SOLIDUS, the name by which the old Roman 'aureus' (equivalent to £1, 1s. 1½d., according to the present value of gold) was known after the time of Alexander Severus; but during the reign of Constantine the Great, its value was diminished in the ratio of 8 : 5, and so remained till the end of the empire. The weight of these later solidi was fixed at ⅙th of an ounce, the gold being 23 carats fine, and the alloy mostly native silver. The 'solidus,' or 'solidus aureus,' was adopted by the Franks under the Merovingians and Carlovingians (at 87 to the Roman pound) till the time of Pepin, who suppressed it; but another solidus of silver, or 'solidus argenteus'—the $\frac{1}{20}$th of the libra or pound—which had been used only as a money of account, was soon after made a coin. In after-times, this 'sol,' or 'sou,' like all other coins, underwent an infinity of variations in fineness and value (see LIVRE). On the introduction of the decimal system (1793) into France, the sou was abolished, and a piece of 5 centimes ($\frac{1}{20}$th of a franc) substituted, but the name continued in common use, and the old sous were retained in circulation. The solidus also appears in the *soldo*, which was a coin in use in Northern and Central Italy, and was essentially the same with the sou.

SO'LINGEN, a town of Prussia, province of the Rhine, and government of Düsseldorf, capital of a circle of the same name, is situated on a height 13 miles east-south-east of Düsseldorf, and not far from the river Wupper. It is a very old place, and has long been famous for its steel and iron ware manufactures, especially sword-blades, helmets, cuirasses, knives, scissors, which are exported to all parts of the world, and rival the excellence of English wares. In 1857, the town and circle of S. employed 8048 workmen, who produced from 400,000 to 500,000 sword-blades yearly, from 1,500,000 to 2,000,000 dozen knives, and nearly 1,000,000 pair of scissors. The total value of the steel-wares amounted to about 5,000,000 thalers. Pop. 10,684.

SOLITAIRE (*Pezophaps*), a genus of birds of the Dodo (q. v.) family (*Didinæ*), but differing from the dodos in a smaller bill and longer legs. Like the dodos, the only species of this genus, of the existence of which there is any evidence (*P. solitaria*), seems to be now extinct, and to have become extinct in very recent times. It inhabited the island of Rodriguez, an island about 15 miles long by 6 broad, situated about 300 miles to the east of Mauritius, and appears to have been peculiar to that small and lonely island, where it was abundant at the beginning of the 18th century. Rodriguez was uninhabited till 1691, when a colony of French Protestant refugees settled on it, under the command of François Leguat, who, in his *Voyages et Aventures*, has left an interesting and trustworthy account of the solitaire. He describes it as a large bird, the males sometimes weighing 45 lbs.; taller than a turkey, the neck a little longer in proportion, and carried erect; the head of the male without comb or crest, that of the female with something like a widow's peak above the bill; the wings small, and the bird incapable of flying, but only using the wings to flap itself or to flutter when calling for its mate, or as a weapon of offence or defence; the bone of the wing being thickened at the extremity so as to form a round mass, about the size of a musket-bullet, under the feathers, and to increase the force of the blow given by it; a roundish mass of feathers instead of a tail. He further describes the plumage as very full and beautiful, not a feather out of its place, so there can have been no feathers with unconnected webs, as in the ostrich. He says the bird is called S. because it is very seldom seen in flocks. He tells us that the bird is with difficulty caught in the forests, but easily on open ground, because it can be outrun by a man; and that its flesh is very good to eat.—But the S. seems to have completely disappeared from Rodriguez, which is now a British settlement. Bones have been found, although not yet abundantly, and some are preserved in the Paris Museum, some in the Andersonian Museum, Glasgow.

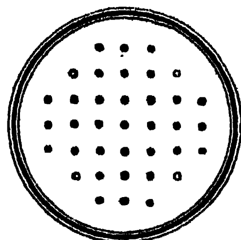


Solitaire (*Pezophaps solitaria*).

The figure here given is derived from a rude cut in Leguat's work, and its general accuracy is attested by its correspondence with small figures introduced in a landscape and two maps in that work.

The name S. was originally given to a species of dodo inhabiting Bourbon, and applied by Leguat to this bird, in a mistaken belief of its being the same. See *Strickland and Melville on the Dodo and its Kindred.*

SOLITAIRE, a species of game or rather puzzle, which, as the name denotes, is played by only one person. The apparatus for the game consists of a round or octagonal flat board, indented with 33 or 37 hemispherical hollows, as in the figure, and 33 or 37 balls, one in each hollow. The process of the game consists in removing one ball from the board, and then, having created a vacancy, capturing one of the balls adjoining by causing the one behind to leap over it into the vacant hollow; there are now two vacancies, and the game is continued in the same manner by capturing ball after ball, till only one remains, when the game is *won*. Should more than one be left, and they be so isolated as not to be liable to capture by each other, the game is *lost*. This puzzle may be solved in an immense number of ways; one of the prettiest modes consists in removing the central ball, and so capturing the others that the last ball shall be in the centre.



Solitaire.

SOLLE'R, a small town and seaport of the Balearic Isles, in Majorca, 14 miles north of Palma. It exports oranges and wine, and contains 7000 inhabitants.

SOLMISATION. See SOLFEGGIO.

SOLO, a term used in musical compositions of several parts, whether vocal or instrumental, to indicate those voices or instruments that are to perform alone or in a more prominent manner, as

soprano solo, *violino solo*. The plural, *soli*, is used when two or more voices or instrumental parts are to be performed together, such parts, of course, never being doubled.—A composition for a single instrument accompanied is also termed a solo.

SOLO'FRA, a small city of Southern Italy, province of Avellino. Pop. 6245. It is situated on the Apennines, and is surrounded by wooded mountains.

SO'LOMON (Hebr. Shĕlômô, Salomon, Salomo, Suleimân, derived from *shalom*, peace = Peaceful, like Germ. Friedrich), the second son of David and Bathsheba; successor of the former on the throne of the Israelitish empire for forty years (1015—975 B. C.*). Nothing is known of his youth except that he was probably educated by Nathan (or Jehiel). Equally uncertain is the age at which he succeeded to the crown of his father. That he was older than twelve or fourteen years, as some traditions tell us, seems certain. The way in which his succession to the throne during the lifetime of his father was brought about, to the exclusion of his elder brother Adonijah, is not undeserving of the name of *coup d'état*, which has been bestowed upon it (see the Scripture narrative). Having, by the execution of Adonijah and the leaders of his faction, secured his dominion against internal foes, he, with complete disregard of the Mosaic law, set himself to seek foreign alliances, and with this view married as his principal wife the daughter of Pharaoh, probably of Psusenes (Vaphres ?), of the twenty-first dynasty. Besides her, however, he had a vast number of wives—700 'princesses,' and 300 'concubines'—the greatest part of whom were recruited from nations with whom an alliance had been strictly prohibited. Having inherited fabulous wealth, and further adding to it enormously from his own multifarious revenues, so that 'silver was nothing accounted of in his days,' it became necessary that a new organisation corresponding to this unheard-of splendour should be introduced. Accordingly, we hear of 'Princes,' i. e., great officers of state, not before heard of. The two counsellors of David's time disappear, in order probably to make room for a whole body of legal advisers; the prophets are no longer to be found among the dignitaries of state, but new military charges are created instead. The immense accumulation of treasure also allowed the execution of a number of public works in Jerusalem, which now first assumed the magnificence and station of a capital. A new wall with fortified towers was erected around it; and the Queen's Palace—'the House of the Forest of Lebanon'—with a long hall joined to it by a cedar porch, called the 'Tower of David,' outside of which a thousand golden shields were suspended, and within which the king sat, in all his imperial splendour, to pass judgment, were built under his immediate orders. His banquets, at which all the vessels were of gold; his stables, with their four (or forty) thousand stalls; his gardens and parks and summer retreats, were such as to dazzle even eastern fancy. Twelve commissaries, distributed in the different provinces, had each in his turn to furnish the means of sustaining this prodigious household. The dominion of S. extended from Thapsacus, on the Euphrates, to Gaza on the Mediterranean. The country was in the profoundest state of peace; the treasures accumulated by David appeared inexhaustible; and the popularity of the king, who listened to the meanest of his subjects, and gave judgment according to that wisdom, for which he had asked in his vision at Gibeon, in preference to any other gift, and which has remained proverbial from his day to ours, was naturally at first very great. Everything, moreover, was done to develop and increase the national wealth and welfare. The rich internal resources were developed, and commercial relations of the most extensive nature established.

Through the port established at Ezion-Geber, at the head of the Gulf of Elath, an outlet was gained to the Indian Ocean; and the alliance with Phœnicia, then under the sway of Hiram, gave an energetic impulse to these foreign expeditions. Manned with Tyrian sailors, the Israelite fleets went to 'Ophir,' and brought back, in exchange for their own exportations, 'gold and silver, apes and peacocks, ivory and spices;' and the rest of the strange and precious produce of India, Africa, Spain, and other regions, possibly even our own coasts.

According to his promise, S., in the fourth year of his accession, commenced the building of the Temple on Moriah, after the model of the Tabernacle, wherein he was aided by Hiram, who not only sent him timber, but architects and cunning Phœnician artists in wood and stone and metals. In the eleventh year of his reign it was completed, and solemnly inaugurated in the following year—at which occasion prodigious numbers of sacrifices were slaughtered. Thirteen years more having been spent in the construction of the 'House of the Forest of Lebanon' (the royal palace), other buildings and fortifications—among them that of Palmyra—are recorded to have been undertaken by the king, who, far from wishing further to extend his dominions, was only bent upon keeping his frontiers safe from the raids of the neighbouring hordes, and for that purpose alone kept up an unprecedentedly large army.

The fame of S. could not but spread far and near. The splendour of his court and reign, heightened by his personal qualities, his wisdom and erudition—for he was not only the wisest but also the most learned of men—brought embassies from all parts to Jerusalem to witness his magnificence, and to lay gifts of tribute at his feet. The queen of Sheba's expedition and presents are well known; and as many Arab kings made him annual presents of a no less splendid nature, his income from different sources was calculated, in round numbers, at the enormous sum of 666 golden talents. That people of Moses, which was to know no other wealth than flocks and the fruits of the soil, had suddenly become a people of wealthy merchants, of soldiers, and of courtiers—and it did not profit by the change, chiefly through the bad influence of the king himself and his court. The army and the public buildings absorbed the resources of the provinces. In the Temple, erected for the purpose of the true worship of Jehovah, S. sacrificed three times a year; but nevertheless, to please his concubines, he allowed, and perhaps himself indulged in, the rites of polytheism on the heights, thereby setting the worst example to his subjects, sufficiently eager already to worship foreign deities. His exaggerated polygamy fostered immorality and licentiousness among the people; and, worst of all, the wise and gentle monarch, as his treasure got exhausted, began, toward the end of his reign, to lay the yoke, which hitherto had lain only on his Canaanite subjects, upon the Israelites themselves. And he thus became, to all intents and purposes, an eastern despot—selling part of his dominion to raise money, and trying to break the spirit of the nation by forced services and corporal chastisements.

Left by the 'prophets,' probably since his open and revolting infidelity with regard to the national worship, his advisers were chiefly insolent young

* There is some discrepancy among investigators about this date; the beginning of his reign being fixed variously at 1009, 1025, 990, &c.

courtiers, who awed even his aged counsellors into silence, and from that time forth a storm began to gather over the land. The priests were on the side of the malcontents, and a vague talk of a general rising, which actually found utterance by a 'prophet' in the face of S., was heard throughout the country. Ahijah of Shiloh predicted, as Samuel had done to David, the partial dominion to the Ephraimite Jeroboam, who had to flee for his life to Egypt. But notwithstanding these internal mutterings, and the open revolts of one or two subject chiefs, such was the prestige both of David's and S.'s name, that the king was allowed to die in peace.

S. is supposed to be the author of Canticles (q. v.), Ecclesiastes (q. v.), Proverbs (q. v.), besides works on Science which are said to be lost. But he is also to be considered the prime cause of the final and decisive downfall of the Jewish commonwealth for all historical times. His wisdom turned into folly, his justice into tyranny, raised a smouldering discontent which only awaited his death to break out into open flames of revolt and internal wars. His character presents the lamentable spectacle of genius gone astray; and many have been the discussions on the part of learned theologians in old and late times as to whether or not there was any hope of his 'salvation.' His name and his glory, however, will, notwithstanding the shadows that fall over his latter days, remain immortal, whether we look at the striking picture of him given in Scripture, or to the more gorgeous kaleidoscope of Eastern legends revolving round the golden name of Suleiman: the Lord and Master of all animate and inanimate beings under the sun, the most beautiful, the most wealthy of all created men, and whose wisdom was as much without limits as were his riches and power.—See for such legendary accounts of S., Weil's *Biblical Legends*, the *Targums*, the *Koran*, Lane's *Arabian Nights*, D'Herbelot, Ginsburg, Fürst's *Perlenschnüre Suleiman-Nameh*, in 70 books, ascribed to a Turkish poet, Firdusi, &c.

SOLOMON ISLANDS, a chain of islands in the Malay or Indian Archipelago, between New Britain on the north-west and the Queen Charlotte Islands on the south-east; lat. 4° 50′—11° 50′ S. Area estimated at 10,000 sq. m.; pop. thought to be considerable, but not ascertained. The natives are partly Negrilloes, partly Malays, and are still in the condition of savages.

SOLOMON'S SEAL (*Polygonatum*), a genus of plants of the natural order *Liliaceæ*, differing from Lily of the Valley (q. v.) chiefly in the cylindrical tubular perianth, and in having the flowers jointed to their flower-stalks. There are three British species. The COMMON S. S. (*P. multiflorum*) is found in woods and copses in many parts of England, and in a few places in Scotland. It has a stem about two feet high, the upper part of which bears a number of large, ovate-elliptical, alternate leaves in two rows. The flower-stalks are generally branched; the flowers not large, white, and drooping.—The NARROW-LEAVED S. S. (*P. verticillatum*) is a rare British plant, only found in a few places in Scotland. The leaves are whorled.—The ANGULAR, or SWEET-SMELLING S. S. (*P. officinale*) is also rare in Britain, and is found only in England. It more nearly resembles the Common S. S., but is smaller, and has greenish, fragrant flowers. All these species are common in many parts of Europe. They are very similar in their properties. The young shoots of *P. officinale* are eaten by the Turks like asparagus. The root is white, fleshy, inodorous, with a sweetish, mucilaginous, acrid taste. It contains *Asparagin*. It is a popular application to bruises, to prevent or remove discoloration, and its use is well known to those who are too apt to get a black eye now and then.



Solomon's Seal (*Polygonatum multiflorum*).

A kind of bread has been made of it in times of scarcity. The berries are emetic and purgative.

SO'LON, the most famous of all the ancient Greek lawgivers, was a native of Athens (born about 638 B. C.), and belonged to one of the most distinguished families of Attica. His father, Execestides, having seriously impaired his income by improvidence, S. was obliged, while still young, to embark in trade. At first, however, S. comes before us as an amatory poet. His earliest appearance in the field of politics was occasioned by the contest between Athens and Megara for the possession of Salamis. By force of artifice, S. revived the martial spirit of his countrymen, which had sunk under the effect of repeated disasters, obtained command of a body of volunteers, and conquered the island (*circa* 596 B. C.), in which, along with others, he obtained a grant of land. Henceforth his public career is conspicuously noble and honourable. He figures as a wise and unselfish patriot, seeking earnestly, and not in vain, to compose the distractions, partly social and partly political, that rent his native city. The Athenians generally had thorough confidence in his integrity; and in 594 B.C. he was chosen archon or chief magistrate, and received unlimited permission to act as he saw best for the good of the state. In short, to borrow a phrase from Roman history, he was invested with dictatorial power. The nature and extent of the Solonian legislation has been the subject of much criticism in modern times, and Mr Grote, in particular, has made it very clear that the 'later ancients' (Plutarch and Diogenes Laërtius), on whom we are obliged to rely for almost all our information about S., are full of confusions, misapprehensions, and contradictions, and that it became a habit among them to mythically attribute to the great Athenian every bit of wise legislation whose paternity they could not discover.

In order to alleviate the wretchedness arising from the existing relations of debtor and creditor, which was no longer supportable, and was likely to create a social war, S. proposed and carried a notable measure—the *seisachtheia*, or 'disburdening ordinance' (from *seio*, to 'shake off,' and *achthos*, a ''burden')—which received its name from its design—viz., to lighten the burden of debt that weighed down the *Thetes*, or lower classes. How this was effected, is far from being correctly explained

by Plutarch, and the reader who wishes to have the most rational solution of the matter must consult Grote's *History of Greece* (vol. iii.). From redressing the grievances of a class, S. proceeded, at the solicitations of his countrymen, to remodel the constitution; and here, too, the qualities that are popularly associated with his name shine out conspicuously. Abandoning the semi-civilised theory which regards the nobles as alone worthy of citizenship, and of the honours of public office in the state, he introduced the timocratic, or rather the plutocratic principle—classifying citizens according to their wealth or property; the effect of which was not to wrest *all* power or dignity from the hands of the *Eupatridæ*, or well-born class, but only to give a portion of it to others who might be as wealthy, and therefore, presumably, as intelligent and cultivated as they. Such a reform has been compared to that previously effected by Servius Tullius in the constitution of ancient Rome; and there is at least a striking resemblance in the method, if not in the design, of the two reforms. See ROME. S. distributed the citizens into four classes. The first embraced all those whose yearly income reached 500 medimni; the second, those of between 300 and 500 medimni; the third, those of between 300 and 200 medimni, and the fourth, those whose income fell below 200 medimni. The first three classes were liable to *direct* taxation; the fourth not; but all were liable to *indirect* taxation. With regard to the *Boule*, or Deliberative Assembly of Four Hundred, it would seem that S. left it the strictly aristocratical body that he found it. Its power, however, was practically limited by a new *ecclesia*, or assembly of the four classes, whose ratification was necessary to all measures originating in the *Boule*, or 'Upper House.' On the other hand, the *ecclesia* itself could originate nothing, and thus the Attic aristocracy and the Attic plebs could mutually check each other's assumptions. The part of S.'s legislation relating to the industrial pursuits of the citizens appears to have been as excellent and well considered as the rest, but the number of his special enactments is so great that we cannot afford space to mention them. It is enough to state that they embraced almost every subject of social importance; and the best testimony to their value lies in the fact, that when Peisistratos violently overthrew the political constitution established by his kinsman, he allowed his social legislation to stand. See PEISISTRATOS.

The story of S.'s leaving Athens for ten years, after he had completed his labours as a lawgiver, and travelling into foreign countries, may be, and probably is historical, but the details are untrustworthy; and in particular, the celebrated incident of his interview with Crœsus will not suit the requirements of chronology, and must be relegated to the domain of historic myths. During his absence, the old dissensions among the Athenians broke out, and when he returned, S. struggled in vain to repress them. A strong hand, as well as a wise head, was needed, and the conspiracy of Peisistratos was quite as much one against anarchy as against the constitution. After S.'s defeat, he withdrew into private life, but occasionally assisted with his advice his bold, ambitious, and able kinsman, who had so effectively crushed the Athenian 'disorderlies' of all parties. The date of his death is uncertain.

SOLO'R ISLANDS, THE, lie east of Flores, between 122° 56′ 30″—124° 25′ E. long., and belong to the Netherlands Residency of Timor. Besides several groups of smaller islands, they consist of Solor, with an area of 105 sq. m., and a pop. of 15,000; Adanara, 302 sq. m., pop. 36,000; Lomblem, 520 sq. m., pop. 120,000; and Pantar, 275 sq. m., with 60,000 inhabitants. Solor and Adanara are separated from Flores by narrow straits; Lomblem and Pantar lie in succession further east.

Solor has little cultivated land, the natives being good sailors, and chiefly employed in fishing. Much sulphur and saltpetre are found, from which gunpowder is made. The women weave coarse fabrics for clothing, and exotic cotton has lately been planted with success. Edible nests are extensively collected. In all the villages on the coast, markets are statedly held, and numerously frequented. The natives near the sea are Malays, friendly to the Dutch, a few of them Christians, the others Mohammedans. Those of the interior are Alfoors, wild and warlike, who use shield and bow, sword and fire-arms. Adanara is governed by an independent rajah. It is a lovely island, having hills and dales, picturesque villages, and cultivated fields. The people are Malays, partly Mohammedans and partly Roman Catholics. Lomblem is also beautiful, the natives Malays; those of Pantar being Papuans.

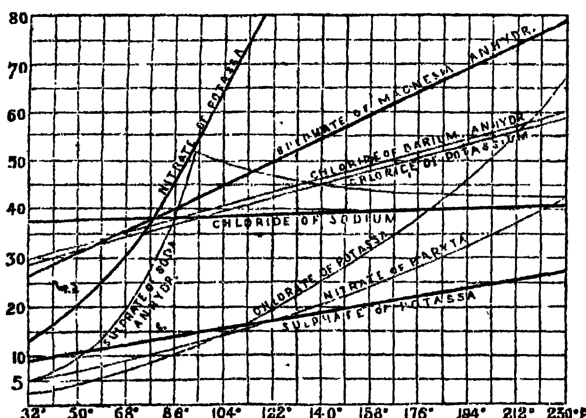
The S. I. are mountainous; the volcano Lobetolle, in Lomblem, is 4914 feet high; and the mountains of Pantar, 3332. They are clothed to their summits with forests. In 1851, the Portuguese relinquished all claim to these islands, which are now governed by the military commander at Larantooka, in the east of Flores; a Dutch postholder being stationed at Lawajang, the chief place of Solor.

SO'LSTICE (Lat. *solstitium*, from *sol*, sun, and *sto*, I stand), that point in the ecliptic at which the sun is furthest removed from the equator, and where he is consequently at the turning-point of his apparent course. There are two such points in the ecliptic, one where it touches the tropic of Cancer, the other where it touches that of Capricorn. The former is the summer, and the latter is the winter solstice to those who inhabit northern latitudes, and *vice versâ*.—The term is also employed to signify the *time* at which the sun attains these two points in its orbit, viz., the 21st of June and the 22d December.

SOLT, a town of Hungary, county of Pesth-Solt, 48 miles south of Pesth, in a marshy district on a branch of the Danube. Pop. 6850.

SOLU'TION. A substance is said to undergo solution, or to become dissolved, when the force of adhesion between it and a liquid in which it is immersed is sufficient to overcome the force of cohesion between the solid particles. Thus sugar or salt is dissolved by water, camphor or resin by spirit of wine, and silver by mercury. The liquid which effects the solution is termed the *solvent*, or sometimes the *menstruum;* and some solutions have special names—for example, the term *syrup* is applied to a solution of sugar in water, and *tincture* to a solution of a solid in alcohol. If a solid body be introduced in successive small portions into a definite quantity of a liquid capable of dissolving it, the first portions disappear the most rapidly, and each successive portion dissolves more slowly than its predecessor, until a point is reached at which the liquid ceases to possess any further solvent power. When this occurs, the forces of cohesion and adhesion are balanced, and the liquid is said to be *saturated*. Solution is promoted by increasing the extent of surface in a solid, or by reducing it to powder. An elevation of temperature, by diminishing cohesion, will generally also increase the solvent power of the liquid; but there are exceptions to this rule—as, for instance, in the case of lime and its salts, water just above the freezing-point dissolving nearly twice as much lime as it does when boiling. A compound of lime and sugar, very soluble in cold water, is separated from the solution almost completely, if heated to boiling.

But the most remarkable case of the kind occurs in sulphate of soda (Glauber's salt), which in its crystalline form dissolves in about ten times its weight of ice-cold water, and rapidly becomes more soluble as the temperature rises until it reaches 91°; from this point until the solution boils, the solubility slightly decreases, the boiling liquid retaining only about four-fifths of the quantity which was dissolved at 91°. Carbonate and seleniate of soda, and sulphate of iron, exhibit the same peculiarity in a less marked degree. 'These anomalous results may be partly explained,' says Dr Miller, 'by the consideration that heat diminishes the force of adhesion as well as that of cohesion. Generally speaking, cohesion is the *more* rapidly diminished of the two, although not uniformly so; and in these cases it would appear that the adhesive force decreases in a greater ratio than the cohesion of the saline particles' (*Chemical Physics*, 3d ed. 1863, p. 72). The accompanying diagram shews the unequal solubility



of various of the more common salts in water of different temperatures. The *lines of solubility* cut the verticals raised from points indicating the temperature upon the lower horizontal line, at heights proportional to the quantities of salt dissolved by 100 parts of water. For example, 100 parts of water dissolve—at 32°, 8 parts, at 122°, 17 parts, and at 212°, 26 parts of sulphate of potash. Water which has been saturated with one substance, that is, which refuses to dissolve any more of that substance, will often continue to dissolve others. In true or simple solution, the properties both of the solid and the solvent are retained. When, however, any chemical action ensues between the solid and the liquid, the resulting solution commonly presents perfectly new and distinct features; as, for example, when the metals are dissolved by acids, or oils by the alkalies (as in soap-making). For the solubility of the gases in water, we must refer to the article GASES.

The uses of solution in laboratory processes are numerous. By the difference in degree of their solubility, we can separate one substance from another; and by dissolving a body we can purify it either by filtration or crystallisation. Moreover, when it is required that two bodies shall react on one another, they do so with incomparably more force in their dissolved than in their solid state.

SOLVENT. See SOLUTION.

SOLWAY FIRTH—in its upper part best regarded as the estuary of the river Esk; in its lower, as an inlet of the Irish Sea—separates the north-west of Cumberland from the south of Scotland. Its entire length, until lost in the Irish Sea, is calculated at 33 miles; its average breadth for the first 12 of these is not more than 2½ miles, but afterwards it gradually, although irregularly, increases to upwards of 20. The principal rivers flowing into it, besides the Esk, are the Annan, Nith, Dee, and Urr, from the north or Scottish side; and the Eden and Derwent from the south or English side. The most striking feature of the S. F. is the rapidity with which its tides ebb and flow. The spring-tides are peculiarly swift and strong—the wave rushing in from 3 to 6 feet high, and at the rate of 8 to 10 miles an hour, occasionally inflicting serious damage on the shipping; while after it has retreated, great stretches of the bed of the firth are left bare, and in some places one can even cross over from the English to the Scottish shore. The salmon-fisheries of the Solway are valuable.—*Solway Moss* is a district of Cumberland about 7 miles in circumference, lying west of Longtown, and immediately adjoining Scotland. As its name implies, it was once a bog, but is now drained and cultivated. It is historically notable as the scene of a battle between the English and Scots in 1542, when the latter were defeated. Here also, on 13th November 1771, an extraordinary disaster occurred. The boggy ground, surcharged with moisture—the effect of heavy rains, rose, swelled, and burst like a torrent, sweeping along with it trees and houses, and destroying some 30 small villages.

SOLYMAN (SULEIMAN) II., surnamed 'THE MAGNIFICENT,' the greatest of the Turkish sultans, was born in 1496; and in September 1520, succeeded his father, Selim I. (q. v.), who had carefully initiated him into the secrets of Ottoman policy. At the commencement of his reign, he restored a large amount of unjustly confiscated property, and removed from office all who were unfit for the proper discharge of their duties. After having suppressed the revolt of the governor of Syria, he exterminated the Egyptian Mamelukes, and concluded a treaty with Persia. The foolish insolence of the Hungarian court next drew him thither with a powerful army, and Belgrade, the key of that country, was captured (1521). He next drove the Knights of St John from Rhodes (1522); and for three years following, devoted himself to improvements in the administration; but his attempts at military reform provoked a rebellion of the janizaries, which he saw no other means of quelling than by engaging them in a war with Hungary. He gained the signal victory of Mohacz (1526), and continuing his resistless course, took Buda and Pesth; but he was recalled by the news of a rebellion in the east, and retreated down the Danube to Constantinople, committing frightful ravages on the way. In 1529, he was summoned to Hungary in aid of his protégé, King John Zapolya, who was contesting the crown with Ferdinand, and accordingly invaded that country with a mighty army, capturing and destroying as he went, and laid siege to Vienna, but after various unsuccessful assaults, he was compelled to retreat. Two years afterwards (1531), he again appeared in Hungary; but his progress this time was checked by Charles V. in person, who had come with the imperial army of 250,000, in aid of his brother. In 1535, he concluded with Francis I. the famous treaty which opened the commerce of the Levant to the French flag alone. In 1540, the long and desultory contest between the Turks and Imperialists for Hungary was ended in favour of the former, who took

complete possession of the country. After this, the alliance between the French and Turks began to bear fruit; the combined fleets ravaged the Italian coasts, and pillaged Nice (1542); but peace was again restored with Germany in 1547. The Turks were now supreme in the Mediterranean; Gozzo and Tripoli fell into their hands, and the conquest of the Banat of Temeswar (1551) assured them a firm hold over Hungary. A second and third war with Persia, which was now in a state of semi-subjugation, the bloodthirsty ambition of his favourite wife Roxolana, who succeeded in persuading him to put to death the children of his other wives, a brilliant naval victory (1561) over the Knights of Malta and their allies the Spaniards, an unsuccessful blockade of Valetta in Malta (1565), and a fresh expedition to Hungary (1566), were the chief events of the remainder of his reign. During this last expedition, while besieging the little town of Szigeth or Szegedin, which resisted all his attacks, he died on the 5th September 1566. S. was no less a politician than a general; he was gifted with uncommon energy, kept his word inviolate, and if his successes were tarnished too frequently with deeds of cruelty, on the other hand, the enormous power at his disposal was infallible security for order and justice among all classes of his subjects. He was a lover of mathematics, and had a particular predilection for history. His financial administration was very successful, and he avoided carefully the two rocks upon which both before and since his time the prosperity of the Ottoman treasury has been wrecked—lavish personal expenditure, and negligence in scrutinising the public accounts.

SOMA ('the moon-plant,' or *Asclepias acida*) is, in the Vedic hymns, the god who represents this plant, and one of the most popular deities of the Vedic religion. The reason for this popularity must be sought for in the important part which the juice of the Soma-plant played in the great Vedic sacrifices, and probably also in its alcoholic and invigorating properties, which the sacrificer experienced when he drunk of it in the exercise of his functions. These properties are constantly described or alluded to in the hymns addressed to Soma. Thus, in some hymns, S. is said to exhilarate Varun'a, Mitra, Indra, and the other gods who partake of its juice; and in another, the worshippers exclaim: 'We have drunk the Soma; we have become immortal; we have entered into light; we have known the gods. What can an enemy now do to us, or what can the malice of any mortal effect?' In other passages, the juice of the Soma is said to be a draught of immortality, medicine for the sick, and a remedy for blindness and lameness. Thus S. became endowed with supernatural qualities and divine attributes, and gradually was exalted as one of the most powerful deities. He is the friend, helper, and soul of Indra; he is the slayer of the cloud-demon Vr'itra, the destroyer of foes, the dispeller of darkness, the creator of the sun, the upholder of the sky, and the sustainer of the earth, the king of gods and men; he is thousand-eyed, the most heroic of heroes; he is wise, strong, energetic, &c. See the interesting article on S. by John Muir, in his 'Contributions to a Knowledge of the Vedic Theogony and Mythology,' in the *Journal of the Royal Asiatic Society*, new series, vol. i. pp. 135, ff. In the classical period of Hinduism, S. ceases to be worshipped in the character which he has at the Vedic period; he then becomes the god of the moon. This transition from Soma, the plant and its juice, to Soma, the moon, which is perceptible even as early as in the S'atapatha Brâhmana of the White Yajurveda (see VEDA), is apparently due to the belief, that *Amr'ita*, the beverage of immortality, was guarded by the moon, and to the circumstance that, in the Vedic hymns, S. is frequently called or described as *Amr'ita*. The myths connected with Soma, the moon, are wholly different from those relating to the Vedic Soma. As moon, S. was born from the eyes of Atri, a son of Brahman, the first god of the Trimûrti (q. v.); and became installed by Brahman as the sovereign of plants, Brâhman'as, and planets. But after he had acquired extensive dominion, he became arrogant and licentious, and carried off Târâ (lit., a star), the wife of Vr'ihaspati, the preceptor of the gods. Vr'ihaspati seeking to recover his bride, and some of the gods siding with him, and others with S., a war broke out, which ended in Târâ's being restored to her husband. The result, however, of her stay with S. was the birth of a son named Budha, who became the ancestor of a celebrated dynasty of kings—from its origin, called the lunar dynasty. For kings of the solar dynasty, see SÛRYA.

SOMA'LI LAND, an extensive maritime country in the east of Africa, is triangular in shape, and is bounded on the N. by the Gulf of Aden, on the S.-E. by the Indian Ocean, and on the S.-W. by the Jub River. From the middle course of the Jub to Cape Guardafui, which forms the apex of the triangle, the distance is nearly 900 miles. The area of the country is estimated at 330,000 sq. m.; but as great part of its interior still remains unexplored, the number of its inhabitants has not been ascertained. The land is elevated and mountainous in the north, and slopes in terraces towards the south. The Jub, which forms the south-west boundary, is a large fertilising stream, drawing its waters from the mountains of Southern Abyssinia, and flowing south-east between the territories of the Gallas on the west, and those of the Somali on the east, to its mouth on the northern frontier of Zanzibar. The Webbe Shebéli, or Haines River, flowing south-east, and the Nogal, flowing east-south-east, are the other chief rivers. The country between the Jub and the Haines is well cultivated, and produces abundance of grain. Between the Haines and Nogal, the country is a flat grassy country, considered by the pastoral Somali a famous cattle district.

The present Somali race were originally Arabs, who landed on the African shore south of the Gulf of Aden early in the 15th century. Driving back the earlier inhabitants of the country, who were Christians, the Moslem made themselves masters of the country. The inhabitants are extremely violent and quarrelsome in their disposition, are notorious for cheating and lying, and for the most part pursue a wandering, pastoral life. The chief trading-place is Berbera, on the north coast; and the products of the country are sheep, cows, ghee, grass-made mats, ostrich-feathers, and hides. These are exchanged at the ports for cloth, dates, rice, beads, and iron.—*What led to the Discovery of the Nile*, by Captain Speke (Blackwood and Sons, Edinburgh, 1864).

SOMERSET HERALD. See HERALD.

SOMERSET HOUSE, in the Strand, London, stands on the site of a palace built by the Protector Somerset about 1549, which fell to the crown on Somerset's execution, and was at different times inhabited by Queen Elizabeth, Anne of Denmark, and Catharine, queen of Charles II. The original Somerset House was pulled down and rebuilt in 1776, after designs by Sir William Chambers, in the Palladian style, for public offices, apartments being given in it by the crown to the Royal Academy of Arts and the Royal Society. Various offices

connected with the navy and other public departments were removed there in 1788; and in 1813 the east wing was completed to form King's College. Among the government offices now in Somerset House are included various departments of the Admiralty, the Audit Office, the Inland Revenue department, the Bank Returns Office, the General Registry Office of Births, Marriages, and Deaths, and others.

SOMERSETSHIRE, a maritime county in the south-west of England, is bounded on the N.-W. by the Bristol Channel, and on the S.-W. and S. by the counties of Devon and Dorset. Area, 1,047,220 acres. Pop. (1861) 444,873. The coast-line exhibits low cliffs and marshy hollows alternately; and its chief indentation is Bridgewater Bay. The only important harbours are at the mouths of the Avon and Parret, which are the two principal rivers, and which, like the most of the other streams, flow through the county in a north-west direction. The most prominent features of the surface of S. are the Mendip Hills (q. v.) toward the north, and the Quantock Hills toward the west, extending from Taunton north-west to the sea, and rising in their highest point, called Will's Neck, 1270 feet above sea-level. Fens and marshes, called 'levels' on the shore of the Channel, are very numerous. Their appearance is monotonous and dreary, but they are fertile and exceedingly valuable as pasture-land. The wheat and barley grown around Bridgewater are famous; but in general, agriculture is in a backward state. The principal products are Cheddar and other cheeses and cider. The minerals are iron, lead, and zinc, and coal and building-stone. The county contains Bath, Wells, and a part of Bristol; Bridgewater, Taunton, Frome, Glastonbury, &c. It returns four members to the House of Commons.

SOMERVILLE, MRS MARY, a lady distinguished by her extensive acquaintance with the physical sciences, was born in Scotland about the year 1780. Her father, Sir William George Fairfax, was a naval officer of considerable reputation, who commanded the *Venerable*, Admiral Duncan's own ship, in the action of Camperdown, and who was afterwards knighted, and advanced to the rank of Vice-admiral of the Red. Mary, his daughter, is said to have been educated at a school in Musselburgh, near Edinburgh. In 1804, she married Samuel Greig, captain and commissioner in the Russian navy, who, being fond of mathematical and astronomical studies, instructed his wife in those pursuits by which she has since become famous. In 1806, Captain Greig died; and in 1812, his widow married Dr William Somerville, of Edinburgh, who subsequently attained the rank of Inspector of the Army Medical Board, and Physician to the Royal Hospital, Chelsea. Mrs S. first became known to the scientific world by some experiments on the magnetic influence of the violet rays of the solar spectrum. Her scientific attainments soon procured for her the acquaintance of Lord Brougham, at whose suggestion she undertook to produce for the Library of Useful Knowledge a summary of the *Mécanique Céleste* of La Place. The work, however, exceeded its dimensions as first contemplated, and was published in an independent form in 1831, with a dedication to Lord Brougham. This work at once achieved for its authoress a high place among the cultivators of physical science. It was followed in 1834 by her treatise *On the Connection of the Physical Sciences*, dedicated to the Queen, and of which a highly flattering notice appeared in the *Quarterly Review* of the time, comparing its authoress to Hypatia and Madame Agnesi. This work has since passed through nine editions in English, and was translated into Italian and published at Florence in 1861. Mrs S.'s next work was her treatise on *Physical Geography*, in two vols. 12mo, published in 1848, and dedicated to Sir John Herschel. Four subsequent editions of this have been since published, besides an Italian translation, of which there have been two editions. In 1860, Dr Somerville died, at the advanced age of 91, at Florence, where Mrs S. still continues to reside, in the enjoyment of excellent health and all her faculties, notwithstanding her advanced age.

SO'MMA, a town of Southern Italy, at the northern base of Mount Vesuvius, 9 miles east of Naples. Pop. 8400.

SOMMARI'VA DEL BOSCO, a city of Northern Italy, province of Cuneo. Pop. 5622.

SOMME (anc. *Samara*), a river of Northern France, rises near Font-Somme, in the dep. of Aisne, and falls into the English Channel midway between Boulogne and Dieppe. Its entire length is about 120 miles, of which one-half is navigable. Its chief tributaries are the Avre and the Luce, and the most notable places past which it flows are St Quentin, Ham (where Louis-Napoleon was confined), Peronne, Amiens, and Abbeville. By means of the canal of St Quentin, it is connected with the Seine and the Scheldt, and by the Crozat Canal with the Oise.

SOMME, a maritime dep. in the north of France, south of Pas-de-Calais, and north-east of Seine-Inférieure. It is formed out of part of Picardy and Artois, has an area of 2377 sq. m., and a pop. (1861) of 572,646. S. is for the most part quite level, and in some parts marshy; sandy towards the coast, but on the eastern frontier broken by spurs of the Ardennes. It is well watered, but the only river of consequence is the Somme. The dep. produces abundance of corn and garden-fruits; also beet-root, oil-yielding plants, and splendid carrots. The rearing of cattle is carried on to a great extent. The chief manufactures are velvets, woollens, cottons, linens, silk, leather, and tapestries, besides beer and cider.

SOMNAMBULISM (Lat. sleep-walking). Walking in sleep is the most palpable, but not the most marvellous characteristic of this condition. The person affected walks, rides, climbs, with the eyes shut or insensible; his movements are precise, cautious, leading him into positions of difficulty and peril, which, if perfectly alive to their real nature, or if acting under the influence of ordinary motives, he would avoid; and yet there appears to be a partial consciousness of surrounding objects, and an adaptation to circumstances. Individuals have, while in this state, performed long journeys on foot or horseback, paying tolls, avoiding obstacles; they have successfully descended into coal-mines; they have ascended in safety to the roofs of houses, have climbed rocky cliffs, and successfully robbed eagles' nests, during the night; millers, saddlers, grooms, sempstresses, have all performed their customary work with perfect exactitude, but without any recollection of their exertions or industry. Notwithstanding the accuracy with which many acts are performed, that particular senses may be dormant is proved by insensibility to loud noises, and by a cook eating cabbage which had been substituted for a salad which he had carefully and artistically prepared. The senses, in relation to the idea or train of ideas present to the mind, appear to be awake, and preternaturally acute. This fact has suggested the hypothesis, that certain faculties are wakeful, open to impressions, and actuated by volition; while others, and the mind in general, are plunged

in profound sleep and unconsciousness. This may be true, and is in harmony with the opinion, that the phenomena are an acted dream or delusion, and that what is seen, heard, or done, is the mere embodiment or repetition of former impressions or impulses, at the time before the mind. This may be illustrated by the case of the student narrated by the Archbishop of Bordeaux, who composed a sermon and wrote out music while asleep; read them over, made corrections, scratched out lines, substituted others, put in its place a word that had been omitted, and continued to do all this, although a sheet of pasteboard was interposed between the writing and his face; shewing that he was copying mental images, and not with the eye.

Somnambulism occurs in the sensitive and excitable, often in conjunction with other nervous affections, and is hereditary; so that it may be regarded as on, if not within, the boundary of disease.—Herbert Mayo, M.D., *On the Truths contained in Popular Superstitions*; Macnish, *Philosophy of Sleep*; Binns on *Sleep*.

SOMNAU'TH, or SOMNATH-PUTTEN, a town of Guzerat, in Hindustan, is situated on the south-west coast of the peninsula of Kattywar (q. v.), about 33 miles from its southern extremity, and has at present a pop. of 5000, most of whom are Mohammedans. The town is fortified by a strong stone wall 9 feet thick, strengthened by 38 towers; it contains many mosques, and the ruins of the celebrated Hindu temple of the idol Somnauth. The ruins of the temple are in a state of fair preservation, and give the idea of its having been a gloomy, massive temple in the form of an oblong hall 96 feet by 68 feet, crowned by a magnificent dome, and covered on the inside and outside with elaborate sculpture and carving illustrative of mythological subjects. The splendour of this temple has doubtless been much exaggerated by various travellers; but a thousand years ago it was so famous as a place of pilgrimage for pious Hindus, as well as for its immense wealth—the accumulations of centuries of presents—that it attracted the zealous idol-destroyer, Mahmud of Ghizni, after he had accomplished his self-imposed mission of conquest, spoliation, and conversion in the rest of Northern India. In 1024, he appeared before S., drove its defenders—who at first had been buoyed up with sanguine hopes that their favourite god had drawn the Mohammedans hither that he might blast them with his wrath—to take refuge in the temple, where they defended themselves with such valour, that Mahmud's army was forced to retreat; but the subsequent rout of two Hindu armies which had advanced to the aid of the sacred city, so dispirited the defenders, that S. was immediately surrendered, the idol destroyed, and the enormous wealth of the temple, consisting chiefly of precious jewels, carried off, along with the gates of the temple. These gates, which are said to have been made of sandal-wood, were brought back from the entrance to Mahmud's tomb in Afghanistan by the British in 1842, and their recovery announced in a magnificent proclamation, which called upon the chiefs of Sirhind, Rajputana, Malwa, Guzerat, to transmit them 'with all honour' to the place whence, eight centuries ago, they had been violently removed. They were, however, never restored to S., as the home authorities disapproved of the tenor of the proclamation, fearing that it might stimulate religious animosity between the two great religious bodies of Hindustan. There was also reasonable ground of doubt as to whether the gates were really the original gates of S., and even whether (since the *Ferishta* does not mention the circumstance) Mahmud had taken away any gates. The repute of S. as a place of religious pilgrimage, and its wealth, revived some time after its spoliation by Sultan Mahmud, to such an extent as frequently to attract the various Mohammedan robber-princes of Western India; and it is still at the present day a chief resort of pious Hindus from all quarters, who pay a small tribute to the Guicowar for liberty to perform their devotions at this favourite shrine.—See Price's *Mohammedan History*, vol. ii.; Dow's translation of the *Ferishta*; Mirkhond's *Rauzat-al-safa*, and Sir John Malcolm's *History of Persia*, vol. i.

SONA'TA, a musical composition for a solo instrument, sometimes accompanied by one or two other instruments, consisting of three, four, or even more movements; these movements usually consist of a subject or subjects, given out first in the key of the dominant, and after certain episodes, in which these themes are presented in a great variety of aspect, they are repeated in the key of the tonic. This form is in general most closely adhered to in the first movement of a sonata, and exhibits great room for a display of the inventiveness and musical resources of the composer. The second movement is generally slower and shorter than the rest, and often in the form of a theme with variations. The most important compositions of this kind are for the pianoforte, many of which have been written by Haydn, Mozart, Beethoven, Clementi, Dussek, and other masters.—A short sonata with two, or at most three movements, less elaborately worked, is called a *Sonatina*.

SO'NCHUS. See Sow Thistle.

SO'NDERSHAUSEN, the chief town of the principality of Schwarzburg-Sondershausen, pleasantly situated on the Wipper, 36 miles north-west of Weimar. Pop. 5000.

SONG, a short poem adapted to a vocal melody. The word is generally applied to the poetical and musical composition in union, but sometimes to one or other separately. The poem generally turns on some single thought or feeling, and is divided into portions of returning measure. The term song, properly implying an air of a simple kind, is often, though not very correctly, applied to the elaborate *aria* of the opera, or the solemn air of the oratorio. A song generally implies an air for a single voice—airs for more than one voice being, however, sometimes called part-songs. England produced in the course of last century a large number of beautiful songs. Of the numerous songs which are continually appearing in this country at the present day, extremely few have musically much merit, and in a large proportion of cases the words are of a silly and insipid description. Germany has of late produced a larger proportion of beautiful songs than any other country. Among songs, not the least interesting are the national and popular airs of different countries, generally of uncertain date, and almost always possessed of much character.

SONG OF BIRDS. All birds have some voice or cry which they utter, and most of them various notes appropriate to various occasions. The power of producing clear and sweet musical notes is chiefly found in certain families of the order *Insessores*; some of which, as the lark, pour forth their song in the air; but the greater number, like the thrush and nightingale, sit whilst they sing. The compass and variety of notes, the power of trilling and shaking, the loudness, clearness, and sweetness of the song, differ very much in different species, each of which may be as perfectly recognised by its song as by its form or plumage. There are also, as is well known, great differences among individuals of the same species, and Mr Jesse asserts his confidence that

there are notable differences between the song of the birds of the same species generally in one district and in another, just as there are provincial dialects and modes of pronunciation in human speech. 'The song, for example, of a thrush near London, or in any of the home counties, has little resemblance, except in specific character, to that of the same bird in Devonshire or near Exeter. The same notes, I suppose, will all of them be detected, but they are arranged for the most part into a different tune, and are not sung in the same way. They are given with different values, and the singing is pitched in a different key. One great distinction between the two cases is the number of guttural notes of which the song of a Devonshire thrush is often made up, but which near London are heard only at the end of a bar, or even much less frequently; while those chief notes, which mainly constitute the song of the other bird, and make it so impressive, are rarely pronounced by the Devonshire thrush.'—*Scenes and Occupations of Country Life*, p. 112.

The singing of birds is chiefly connected with the love-season; although some birds sing at other seasons also, during fine weather, and when food is abundant, as if merely to utter their happiness, and by uttering, to increase it. It is during the pairing-time that they are most vocal; the singing of many is continued with frequency also during the period of incubation, but with some change of character. It is the male alone that sings. Female birds have voice also, but do not possess the power of warbling like their mates. There are generally considerable anatomical differences in the larynx of the two sexes.

There can be no doubt that the singing of the male bird is intended to attract and please the female, and that he delights in this display of his own powers. In this respect, there is no difference between the birds of most melodious song and those of harsh discordant voice. The crowing of the cock and the gobbling of the turkey have the same purpose as the song of the nightingale. In them may be also seen an emulation which is ready further to display itself in combats, and probably these take place among the males of all birds. But questions of rivalry seem in part to be decided amongst some of the songsters of the groves by mere musical displays. Caged birds evidently often sing from emulation. Remarkable proofs of the extent to which this feeling prevails with regard to the musical powers, are afforded by well-authenticated anecdotes.

The imitative powers so remarkably possessed by the mocking-bird and a few other species, are to some extent possessed by many birds.

SONGHAY, a former kingdom of Africa, extended both on the east and west banks of the river Niger to the south of the angle which that river makes at Burrum, in lat. 17° 30′ N. The reigning king, said to have been the fifteenth of his dynasty, embraced Islam in the beginning of the 11th century. In 1468—1469, the ruler of S. marched upon Timbuktu, conquered the town and surrounding state, and added them to his own kingdom. Under Hâj Mohammed A'skia, who came into power at the end of the 15th c., and who was perhaps the greatest sovereign that ever ruled over Negroland, the S. empire extended from Hausa almost to the shores of the Atlantic, and from lat. 12° N. to the confines of Morocco. After many years of revolution and civil war, this great empire became a province of Morocco in 1607.

SO'NNET, a short poetical piece, generally lyrical in its nature, and dealing with *one* idea of a grave nature, presented under various aspects. It is restricted in length to fourteen lines; the arrangement of the rhimes is peculiar and intricate, and will be best understood by an example—Wordsworth's Sonnet on the Sonnet—

Nuns fret not at their convent's narrow room;
And hermits are contented with their cells;
And students with their pensive citadels:
Maids at the wheel, the weaver at his loom,
Sit blithe and happy; bees that soar for bloom,
High as the highest peak of Furness Fells,
Will murmur by the hour in foxglove bells:
In truth, the prison, unto which we doom
Ourselves, no prison is: and hence to me,
In sundry moods, 'twas pastime to be bound
Within the Sonnet's scanty plot of ground:
Pleased if some souls (for such there needs must be)
Who have felt the weight of too much liberty,
Should find short solace there, as I have found.

SON OF GOD. Considered from the side of dogmatic theology, the phrase Son of God denotes the Second Person of the Trinity (q. v.), and is conceived to have been applied to him on account of that subordination to the Father, to which from all eternity he voluntarily submitted, and which, it is thought, peculiarly fitted him for accomplishing the work of redemption. If we examine the use of the name in the Scriptures, it appears to have been both applied by Jesus to himself, and given to him by his disciples, to express a singular and mysterious relationship in which he stood to God. The phrase was one not altogether unknown to the Jews. The plural, 'sons of God,' occurs several times in the Old Testament (Gen. vi. 2, 4; Job i. 6, ii. 1; Psalm lxxxii. 6, &c.); but in all these cases it is applied (tropically) to angels or persons possessing some exalted dignity; and the children of Israel, in their collective capacity as the favoured nation, are twice called by God his 'son' (Ex. iv. 22, 23; Hosea xi. 1). The use made in the New Testament of the famous passage of the 2d Psalm ('Thou art my Son; this day have I begotten thee') is thought to constitute conclusive evidence that the spiritually-minded among the ancient people recognised a 'Son of God.' The only direct and literal occurrence of the phrase 'Son of God' is found in the Book of Daniel (iii. 25, 'The form of the fourth is like the *Son of God*'), and this singular circumstance has suggested the idea, that the Hebrew conception of a Messiah or anointed deliverer was first connected and combined with the still grander conception of a divine nature under Assyrian or Persico-Assyrian influences. If, it is argued, the Hebrews generally, or even their spiritual leaders, had believed the Messiah to be the 'Son of God' in any other sense than that he was prophetically filled with the Spirit of God, both the idea and the phrase would have played a far more prominent part than they do in the religion and literature of the nation. Nor does it appear that the idea of a 'Son of God' (in the literal sense) ever rooted itself in the Hebrew mind, which, from its sublime conviction of the unity of God, seems to have always regarded this approach to dualism in the Godhead with peculiar aversion. Hence, we find that the assumption of the title by Jesus provoked the bitterest opposition on the part of the great majority of his countrymen. They did not hate him because he claimed to be the 'Messiah,' the 'Christ;' on the contrary, they were prepared to accept as such any teacher whose words or works seemed to justify his pretensions to the dignity; but when Jesus claimed to be the 'Son of God,' equal and one with the Father, they sought to stone him. It was, in fact, this assertion of his divinity that cost Jesus his life.

SONO'RA, a frontier state in the north-west of Mexico, bounded on the N. by the United States' territory of New Mexico, and on the W. by Lower California and the Gulf of California. Area, 131,117 sq. m.; pop. (in 1859) 135,000. Several fine bays indent the coast; lagoons occur near the shore; and in the western part of the state, there are several lakes. The great system of the Andes skirts the eastern frontier, and throws off branches which occupy much of the surface of the state. In the west, the surface is mostly flat, with a fertile soil, and a warm but variable climate. The chief rivers are the Rio Colorado, Sonora, Yaqui, and Mayo. Two abundant crops are gathered every year from the same land; and the principal crops are wheat, maize, peas, and beans; though tobacco, sugar-cane, and cotton are also grown. But the wealth of the state is not in its agricultural capabilities, but in its mineral treasures, which are considered inexhaustible. 'Hardly a village or grazing estate,' writes a recent traveller, 'but can shew some vein of gold, silver, lead, or copper;' and he thinks that in all probability 'not a fourth of its existing metallic wealth is known, while not a moiety of that has been or is being developed.' The inhabitants of S. are for the most part degraded, indolent, and uneducated, and among them mining enterprise has now reached its lowest ebb.—See *Arizona and Sonora*, by Sylvester Mowry (Lond. 1864).

SONSONA'TÉ, a town of Central America, in San Salvador, and 40 miles west-north-west of the city of that name. Pop. about 10,000 inhabitants.

SOOLOO' ISLANDS. See SULU ISLANDS.

SOO'SOO (*Platanista Gangeticus* or *Soosoo Gangeticus*), a cetacean of the Dolphin family, inhabiting the Ganges, and most abundant in the sluggish waters of its delta, but found also as far up the river as it is navigable. It is supposed to be the



Soosoo (*Platanista Gangeticus*).

Platanista of Pliny. It is the only known existing species of its genus, and is interesting as a fresh-water cetacean. It attains the length of about 12 feet, and is not unlike the dolphins in its general form. The habits of the S. are sluggish, except that in pursuit of prey it moves with great energy and rapidity. The flesh resembles lean beef, but is never eaten by the Hindus, who, however, set a great value on the fat, which lies between the skin and the flesh, as an external medicinal application. There are several fossil species of this genus.

SOOT is that portion of fuel which escapes combustion, and which is mechanically carried up by the current of hot air, either to be deposited on the sides of the chimney, or to be discharged into the atmosphere. The soot of coal and that of wood in all probability differ materially, the former containing more carbonaceous matter and more ammoniacal salts than the latter. Braconnet published an elaborate analysis of the soot of wood; but good recent analyses of both kinds of soot are still required. Both kinds are used as manure; and wood-soot, under the title *Fuligo Ligni*, was formerly contained in the British Pharmacopœias. According to Neligan, it has been found most efficacious in the latter stages of hooping-cough in children, and in some forms of hysteria; and he gives directions for the preparation of a Decoction, an Extract, a Spirit, and a Tincture. See Neligan's *Medicines, &c.* (6th ed., p. 53). Contact with soot often gives rise to a peculiar form of cancer, which is consequently known as *Chimney-Sweepers' Cancer.*

SOPHI'A, a town of Bulgaria, 170 miles north-west of Adrianople, in a beautiful plain on the river Isker. Besides about 30 mosques, it contains several Christian churches, is the see of a Greek and a Roman Catholic archbishop, and carries on manufactures of cloth, leather, silk goods, and tobacco. Its hot springs and baths are highly esteemed. Pop. 24,000. S. occupies the site of the ancient Sardica.

SOPHIA, ST, CHURCH AND MOSQUE OF, a celebrated structure at Constantinople, long an object of great interest to all visitors of that city. It was originally built by the Emperor Constantine in 325—326, on occasion of the translation of the seat of empire to Byzantium; and is so called as being dedicated, not, as commonly supposed, to a saint of that name, but to the *Hagia Sophia* (Holy Wisdom), that is, to the Eternal Wisdom of God or the Logos, the Second Person of the Trinity. The building of Constantine was subsequently rebuilt and enlarged by his son Constantius; and this second church of Constantius having been destroyed in 404, was rebuilt by Theodosius the Younger in 415; and it lasted unaltered till the celebrated Nika Sedition, or Battle of the Factions of the Circus, under Justinian, in 532, in which it was totally destroyed. The present building is substantially that which was erected by Justinian in expiation of this sacrilege. It occupied less than seven years in its erection, and the history of the work and of the details of its material and construction are full of marvels. Ten thousand workmen are said to have been employed upon it. The materials were supplied from every part of the empire, and comprised remains of almost every celebrated temple of the ancient paganism. The sedilia of the priests and those of the patriarch were of silver gilt. The dome of the tabernacle was of pure gold, and was surmounted by a gold cross weighing 75 lbs., and encrusted with precious stones. All the sacred vessels and other apparatus were of gold. The altar-cloths were embroidered with gold and pearls; and the altar itself was composed of a mass of molten gold, into which were thrown pearls, sapphires, diamonds, onyxes, and every other object which could raise its costliness to the highest imaginable degree. The total cost of the structure is stated by the ancient authorities at 320,000 *pounds*. Some regard this as pounds-weight of silver, others as of gold. One of the latest writers on the subject, Mr Neale (*Eastern Church*, vol. i. p. 237), adopts the latter estimate, and thus computes the cost at the enormous sum of £13,000,000!

The building may be described as a square of 241 feet, forming interiorly a Greek cross, and surrounded in the interior by a woman's choir or gallery, supported by magnificent pillars, for the most part borrowed from ancient buildings. In the centre rises a dome, which is supported by two great semi-domes, which in their turn rest upon smaller semi-domes, the whole presenting a series of unexampled beauty. The height of the dome is 175 feet. The building is approached by a double

porch, which is about 100 feet in depth. The whole of the interior was richly decorated with sculptured marble and mosaics. Even in the reign of Justinian, a further reconstruction of the building became necessary, the dome having fallen in, on an earthquake; but this may be said to have been the last important change in the structure within the Christian period of Constantinople.

On the occupation of that city by the Turks in 1453, St S. was appropriated as a mosque. All its purely Christian fittings and internal structures were swept away. The Christian emblems were either mutilated or covered up from view by a coating of plaster. The latter course was adopted throughout the building in the case of mosaic pictures containing representations of the human figure, which the Koran proscribes as unlawful, and thus the original mosaics of the Justinian era have in great part escaped destruction. Some years since, the late sultan, Abdul Medjid, having ordered a complete restoration of the building, these mosaics were accidentally brought to light, and, with the consent of the sultan, artists were sent out from Berlin, who, with the assistance of the architect employed by the Turkish government, made accurate copies of all these interesting relics of antiquity, which have been published at the expense of the Prussian government by M. Salzenberg, the artist thus employed by the king. The interior of the building at present is very judiciously restored for Mohammedan worship, the Christian decorations being again carefully covered up, coated with plaster in imitation of mosaic-work. Like all mosques, St S. is closed against Christian visitors except upon special firman, which, however, is easily obtained, and the privilege may be had at small expense by the traveller through the interposition of the masters of the principal hotels.—See Von Hammer's *Constantinopolis und der Bosporos* (2 vols. 8vo, Pesth, 1822); Salzenberg's *Alt-christliche Baudenkmale Konstantinopels* (Berlin, 1854); Haghes, *Aya Sofia Constantinople* (London, 1854); also *Edinb. Review*, April 1865, p. 456, and foll.

SO'PHISTS. The Sophists were the leading public teachers in ancient Greece during the 5th and 4th centuries B.C., and their character has been a subject of much dispute. Most of the historians of philosophy—influenced seemingly by the lampoons of Aristophanes, the comic poet, and by the disparaging remarks of Socrates, Plato, and Aristotle, who stood in a quite different position from the teachers by profession—represent the Sophists as 'ostentatious impostors, flattering and duping the rich youth for their own personal gain, undermining the morality of Athens, public and private, and encouraging their pupils to unscrupulous ambition and cupidity.' Mr Grote, in his *History of Greece*, chap. lxvii., has combated these positions, and given a much more favourable view of the Sophists.

A Sophist, in the original sense of the word (derived from *sophos*, wise or learned), was a wise man, a clever man, one who stood prominently before the public for intellect or talent. Solon and Pythagoras are called Sophists; the name was applied even to great poets. Socrates was repeatedly so designated; Plato is alluded to by the same title. By the general public, any man of intellectual eminence would be spoken of as a Sophist. With the feeling of admiration towards the intellectual class, there was mixed up a certain invidious sentiment, from whatever cause arising; and the name Sophist being often used to express the dislike as well as the admiration, came ultimately to have a predominating bad sense. Still, the general public, in the use of the word, comprehended Socrates, Plato, and Aristotle, and their philosophical disciples and followers, equally with the professional teachers.

The great intellectual start made in Greece during the 5th c. B.C., led to an advanced standard of general instruction. There had been an established popular education long before—including music, reading, and recitation—but now there were found among the public teachers men of the highest accomplishments that the age could furnish, who taught whatever was known of astronomy, geography, and physics, as well as the newly started controversial discussions in ethics and in metaphysics. These men shared with the other intellectual celebrities the title of Sophist. But there was one circumstance in their case that greatly deepened the invidious sentiment—they taught for pay. This brought them under the odium of two classes: in the first place, the poor, who could not afford the fees, felt themselves in a new position of inequality with the rich; secondly, the philosophers, properly so called, who had not yet begun to receive money from their disciples, held in contempt those that did. Both Socrates and Plato had a vehement repugnance to the idea of a money-bargain between master and pupil; in their eyes, the relationship was one of pure attachment and devotion; and they considered that all the invidious part of the designation Sophist, and more, was richly deserved by the teachers for hire; and as these public teachers, by the nature of their vocation, would probably be often shallow and superficial, as compared with the great philosophers, we can understand the full definition of Sophist by Aristotle—'an impostrous pretender to knowledge, a man who employs what he knows to be fallacy, for the purpose of deceit and of getting money.' With all the great authority of Aristotle, this charge applied indiscriminately to the body of men employed in training youth for active life, will not bear investigation. Enough is known of the lives, characters, and doctrines of the class to refute the accusation. The Sophists were a profession growing out of the circumstances, and supplying a want, of the age. The most valuable ideas and habits of any accomplished Athenian were due to his education under some teacher of the class Rhetor or Sophist. So far from the age of the Sophists being an age of corrupted public morality, Mr Grote contends that it was the reverse. He adduces a multitude of historical facts to prove that the morality of the Athenian public was greatly improved at the end of the 5th c. B.C., as compared with the beginning of that century.

SO'PHOCLÉS, the great master of Greek tragedy, was born at Colonus, a village about a mile from Athens. The date of his birth is not exactly known, but is fixed at 495 B.C. Sophillus, his father, a man of good birth and fortune, bestowed much care on his son's education; insomuch that, aided by his highly prepossessing appearance, S. was selected for his skill in poetry and music to lead with dance and the lyre, after the victory of Salamis, the chorus of youths in a triumphal pæan composed by himself. In his 28th year, he is said to have *exhibited* his first play; and three years before, in a contest with rival scenic writers, one of whom was Æschylus, he gained the first prize, by the decision of the judges Cimon and his colleagues. He had, by Nicostrata, two sons, and one by Theoris, a Sicyonian woman. Iophon, one of his two sons by Nicostrata, summoned him in his old age before the Phratores, on the charge of incapacity to manage his private affairs, but he refuted the charge by reciting to the court a beautiful chorus from his *Œdipus in Colonus*. He died at the age of 90, full of years and honours. His private character

was easy and contented, but not, as has been hastily assumed, profligate. His turn of mind was devout, as is evident throughout his plays; and he evinced no taste for political or active life, although he is said to have accepted command in the Samian war. He was a prolific author. He was the reputed composer of as many as 130 plays, of which, however, 17 have been deemed spurious. He gained, according to his biographer, the first tragic prize 20 times, bearing the palm on several occasions from Æschylus and Euripides, not to mention less well-known competitors. He wrote also pæans, elegies, and epigrams, of which we have but few remains. He lived on terms of intimacy not only with his great rivals, but with Aristophanes and Herodotus. We have no knowledge of the order in which his plays, that have survived, were written. The most plausible arrangement is perhaps that of Müller, who graduates them as follows: *Antigone, Electra, Trachiniæ, Œdipus Rex, Ajax, Philoctetes, Œdipus Coloneus*. S. is justly accounted the most perfect of the Attic tragedians. In his hands, tragedy becomes the true and faithful reflex of human feelings, passions, impulses. His ideas are ethical, with a constant reference to a divine disposer of events. 'There has hardly,' says Müller, 'been any poet whose works can be compared with those of Sophocles for the universality and durability of their moral significance. Of all the poets of antiquity, he has penetrated most deeply into the human heart.' His versification is remarkable for its softness and fluency. The best editions are those of Wunder (Gotha and Erfurt, 1831—1846) and Schneidewin. The chief translations of S. into English are those of Potter (Lond. 1788), Dale (Lond. 1824), and recently (1865) of Plumptre. Besides these we may mention special translations by Professor D'Arcy Thompson of the *Ajax*, and by Dr Donaldson of the *Antigone*.

SOPRA'NO (Ital.), the highest species of female voice, whose range extends from [musical notation] to [musical notation], or in some cases higher. The highest notes generally belong to the falsetto register. Sweetness and mellowness are the characteristic qualities of a soprano voice, which is for the most part less full than an alto, but lighter, fresher, and more expressive of joyful, lively, and highly impassioned feelings. Music for soprano voices is usually written in the treble clef, but sometimes in the soprano clef with C on the first line [musical notation]. A voice sometimes distinguished as intermediate between alto and soprano, is the *Mezzo-soprano*, whose usual compass is from [musical notation] to [musical notation].

SO'RA, a city of Southern Italy, in the province of Terra di Lavoro, with 12,031 inhabitants. It stands in a fertile plain, watered on one side by the Liris or Garigliano, which is spanned by two bridges at the town. The population is industrious and wealthy. There are manufactories of woollen cloth and of paper. S. was originally a Volscian town, passed into the possession of the Samnites, and then into that of the Romans. Remains of the cyclopean walls of the ancient citadel are still visible.

SO'RAU, a town of Prussia, in the province of Brandenburg, 60 miles south-south-east of Frankfurt-on-the-Oder. It has important bleach-fields, print-works, and colour-works. Pop. 9393. S. is one of the oldest towns in Prussia.

SORB. See SERVICE.

SORBONNE, a celebrated academic body at Paris, which dates from the middle of the 13th c., and which, down to the French Revolution, held a prominent place in every doctrinal, liturgical, or canonical controversy which arose in the church. It derives its name from its founder, Robert de Sorbon, a canon of Cambrai, born of a humble family, in the village of Sorbon, in the Ardennes, in 1201. Being recommended by his learning and virtues to Louis IX., he was selected by that king as his chaplain and confessor. At this time, the university of Paris was at the very height of its celebrity, and Robert de Sorbon conceived a project for rendering its advantages accessible to poor students, by opening an institution in which a society of secular priests, being provided with all the necessaries for their own maintenance, should devote themselves gratuitously to the teaching of theology. It was established with the full sanction and warm encouragement of King (afterwards St) Louis in 1252, originally for the reception of sixteen scholars, four respectively from the Gaulish, Norman, Picard, and English nations, to which the German was subsequently added. Robert was himself the first head; but it was not till after 18 years that he drew up the constitution of the association, which, it may be added, remained in force without any substantial alteration till the French Revolution. The institution was not confined to the poor scholars of the original establishment, but extended to the bachelors and doctors aggregated to the body of the Sorbonne. All these were of necessity graduates of the Faculty of Theology of the university of Paris, but they were only admitted to membership of the Sorbonne by the votes of that body, which formed one of the four constituent parts of the Theological Faculty, and after a public disputation, technically called the 'Sorbonica,' or 'Robertina,' in which the disputant was required to sustain, against all antagonists, from the hour of five in the morning to that of seven in the afternoon, theses or propositions selected from the whole range of theological science. The first recorded actor in this great theological tournament was a Franciscan friar named Mayron, a scholar of John Duns Scotus; but he was followed by a long roll of imitators, in which are found many of the greatest names in medieval and post-reformation history. These 'Sorbonne Acts' form in some respects one of the most characteristic chapters in medieval literary history, the succession of disputants and the variety of subjects being altogether extraordinary. The disputants in some cases exceeded sixty in number. The foundation of Robert de Sorbon was approved in 1268 by Clement IV.; but the name of Sorbonne does not appear to have been appropriated to it till some time in the course of the 14th century. Robert de Sorbon also established another college for the study of the Humanities and Philosophy, which was called the college of Calvi, or the Little Sorbonne, and seems to have been preparatory to the Sorbonne course of study. In the 15th c., the Sorbonne, as being in great measure identified with the Theological Faculty of the Paris University, holds an important place in the history of theological controversy, and in all the contests which followed the Reformation in France, it holds a foremost rank; there being few of the great names of the Gallican Church which are not included in its academic roll. Among the munificent works of the great Cardinal Richelieu, who was a pupil of the Sorbonne, was what may be described as a complete reconstruction of the

buildings. The new Sorbonne comprised, in addition to the public academical hall, lodgings for the 36 doctors, which were assigned to the doctors successively in the order of seniority. The head of the Sorbonne institute was called Proviser, and was elected by the members, together with the Archdeacon of Paris, the four Deans of Faculty, and some other dignitaries of the university. Besides the resident members of the Sorbonne, there were also external associates, called 'Socii Hospitalitatis,' who had no share in the deliberations of the body or the governmental acts of the institution. The Sorbonne continued in the enjoyment of its privileges and its revenues down to the Revolution, when it shared in the common ruin of all the ecclesiastical establishments of France. At the reorganisation of the university by Napoleon in 1808, the Sorbonne was re-established as the Theological Faculty of that body; but it failed to recover its old prestige even with the clerical body. One of the conditions of membership was an oath to maintain the celebrated four 'Gallican Propositions.' See GALLICAN CHURCH. This condition deterred many; and although it was revoked by the proposed concordat of 1817, yet, on the failure of this concordat, it still continued in force down to the revolution of 1830. In the more recent organisation of the university, the Sorbonne has no distinct or special character; but its halls still retain their ancient appellation.—See Wetser's *Kirchen-lexicon*, 'Sorbonne.'

SORE'CIDÆ, a family of Mammalia, of the order *Carnaria*, and section *Insectivora* of Cuvier. They are generally small animals, covered with soft hair; under which, on each flank, is a band of stiff closely-set bristles, and among them glands which exude a peculiar odorous fluid. The legs are short, and the feet are five-toed, and generally formed for burrowing. Some species are aquatic, and their feet webbed. The S. are all plantigrade. Most of them are nocturnal animals. They generally feed on insects and worms. A remarkable characteristic of the family is the elongated muzzle. They have long incisors, and their molar teeth are generally furnished with conical points. The tail is generally scaly. To this family belong Shrews, Shrew-mice, Musk Rats or Desmans, &c. They are found both in warm and cold climates. Those which inhabit cold climates generally pass the winter in a lethargic or dormant state.

SORESI'NA, a large mercantile town of Northern Italy, province of Cremona, with 8356 inhabitants. A great trade is carried on in a kind of condiment called *Mostarda*, which is prepared there, consisting of fruits, &c., preserved in vinegar and sugar, and also in a kind of liqueur called *Mistrà*, held in great repute in Italy as a carminative.

SO'RGHO GRASS AND SORGHUM. See DURRA.

SO'RIA. See NUMANTIA.

SOROCA'BA, a town of Brazil, in the province of São Paulo, stands on a river of the same name, 70 miles west of the city of São Paulo. Pop. 12,000.

SO'RREL (*Rumex*), a genus of plants of the natural order *Polygoneæ*, very closely allied to *Polygonum* (q. v.) and *Fagopyrum* (see BUCKWHEAT), but having the perianth divided into six segments, the three inner of which enlarge and cover the *achenium*. The genus is very naturally divided into two sections, the first of which is already noticed in the article DOCK. The name S. belongs only to the second, characterised by diœcious flowers, and acidity of stems and leaves. COMMON S. (*R. acetosa*) is a perennial found in meadows and pastures throughout the whole of Europe, and is very plentiful in Britain. Its stem is from a foot to two feet high; its leaves arrow-shaped. It is an agreeable salad, and is used in soups and sauces, and as an addition to dishes of greens. It is therefore sometimes cultivated in gardens.—FRENCH S., or ROMAN S. (*R. scutatus*), a native of France and Italy, has broader and blunter leaves, and is more frequently cultivated than Common S., being considered of finer flavour.—SHEEP'S S. (*R. acetosella*) is a very similar plant, but of much smaller size, and its roots run very much under-ground, so that it is a very troublesome weed in gardens and fields of poor dry soil, in which it is very common in all parts of Britain.—For WOOD S., see OXALIDEÆ.—For the RED S. of the West Indies, see HIBISCUS.

SORREL TREE (*Lyonia arborea*, formerly *Andromeda arborea*), a tree of the natural order *Ericeæ*, remarkable in that portion of the order to which it belongs for its magnitude, its near allies being generally small shrubs. It grows chiefly on the Alleghany Mountains, from Virginia to Georgia, and attains a height of 50 feet, with a trunk 12—15 inches in diameter. The wood is of little or no use. The leaves are acid, and are sometimes used for dyeing wool black.

SORRE'NTO (Lat. *Surrentum*, Gr. *Syrentum*), a maritime town in the south of Italy, province of Naples, is situated on the south-east side of the beautiful Bay of Naples, on the promontory which separates the latter from the Gulf of Salerno, about 7 miles south-west of Castellamare. Pop. 7180. It is an archiepiscopal see, and possesses a cathedral. The manufacture of silk is extensively carried on. There are still considerable remains of the walls which were erected in the middle ages, and on the landward side it is surrounded by a broad and deep ravine, the side towards the sea being protected by precipitous rocks. On the north-west of the town is a considerable plain or table-land, called *Piano di Sorrento*, about 1000 feet above the sea-level, surrounded and protected from the cold east winds by a range of hills; it is intersected by numerous gorges and ravines, studded with villas and farm-houses, and covered with orange groves and vineyards; all which combined render the vicinity of the city in a high degree picturesque. It is celebrated for the mildness, dryness, and general salubrity of its climate, on which account it has been much resorted to both in ancient and modern times by invalids and convalescents. Among the Romans, the wine of S. was held in high reputation; it had to be kept about 25 years before it arrived at maturity. Nothing certain is known of the origin of S., but it is believed to be very ancient, and many ruins are pointed out by the *ciceroni* as being remains of Roman temples, &c. Tasso was a native of Sorrento.

SO'RTES BI'BLICÆ, SORTES VIRGILIA'NÆ, &c.—Among the ancients, a favourite kind of divination was that known as *Stichomancy*, or divination by lines of poetry. The method pursued was to select a number of verses from a poet, mix them together in an urn, draw one out at random, and from its contents to infer good or evil. As Virgil was the most popular and admired of all the Latin poets, his writings, and especially the *Æneid*, became the favourite book for this purpose, and it was undoubtedly this practice that laid the basis of the great reputation as a magician Virgil enjoyed during the middle ages. The Sibylline oracles were also much used for the same purpose. The practice did not cease with the introduction of Christianity; but instead of Virgil, or, to speak more correctly, alongside of Virgil, the Bible was

employed to ascertain the future. In place, however, of throwing lines into a 'heathen' urn, it was customary to open the book, as it were, accidentally, or to stick a pin between the leaves at hazard, and then open the book—the passage first catching the eye being regarded as pregnant with prophecy as to your future welfare. Such lots drawn from Scripture were called, in the middle ages, *Sortes Biblicæ*, just as those drawn from Virgil were called *Sortes Virgilianæ*. The custom of using (or abusing) the Bible in this grossly superstitious way still lingers in England, Scotland, and other countries, but it is now more a frolic of children than aught else.

SO'RTIE, an outrush of a beleaguered garrison, equivalent to SALLY (see SALLY-PORT).

SORUS. See FERNS.

SOSTENU'TO (Ital.), a term used in musical notation, to indicate a sustained mode of execution, continuous in respect of tone.

SOTTEVILLE-LÈS-ROUEN, a small town of France, in the dep. of Seine-Inférieure, 4 miles south of Rouen by railway. Pop. (1862) 8182.

SOU, or **SOL**. See SOLIDUS.

SOUARI NUT. See CARYOCAR.

SOUDAN. See SUDAN.

SOUFFLÉ, a light and agreeable dish, consisting chiefly of the whites of eggs, to which other ingredients (chocolate, cheese, vanilla, orange-flower water, rose-water, various essences, &c.) are added, to give consistency, flavour, and variety. The materials have to be agitated with a whisk until the whole is in a creamy froth; which is then baked in a soufflé-pan, made of such a form as to fit into a dish or proper holder, that can be sent to table, and quickly handed round.

SOUKCHOU'M KALE', a seaport town of Asiatic Russia, in the government of Transcaucasia, on the east coast of the Black Sea. In 1831, a commercial port was established here, which, however, has not fulfilled the expectations that were formed regarding it, having surrendered its preeminence to Potti, a town about 70 miles to the south-east.

SOUL, in the language of spiritualistic philosophers, covers the whole region of mind, and is generally conceived of as a naturally imperishable entity, in relation with the body, but definable, for the most part, only in terms of the complete negation of material attributes. With this the popular conception in the main coincides, though it is less laboured, and considerably less negative. In its original signification, the word appears to have stood for the principle of life both in men and in animals. The modes of conceiving it were various: it was sometimes regarded as the mere harmony of the bodily functions, and sometimes as a distinct entity of highly ethereal nature, and generally supposed to be seated in, or connected with, the blood; but no essential distinction was made between the soul of man and the soul of brutes. Very soon, however, the manifest superiority of man to the lower creation suggested difficulties, which were increased as the thought of an after-life, in a different sense from transmigration, was gradually developed. And in man, the constant war among his members, the opposition of passion and reason, as it began to be observed with the growing habit of introspection, called for some explanation which should apply to humanity only. To meet all such difficulties, a 'Trichotomy,' or three-fold division of the human constitution, was assumed, according to which a naturally immortal and rational element was supposed to make part of man, besides the animal soul (always variously conceived) which he shared with the brutes. Between the two distinct elements—the animal and the rational soul—the various mental energies were differently apportioned by different thinkers, according as these energies were thought more or less noble and divine. Without going back upon obscure traditions, regarding the beliefs of the early peoples, Plato's views may be cited as amounting to a Trichotomy, and in Aristotle there is the distinct mention of a noetic principle in man by the side of the animal soul. Later Greek schools put forward a similar view; and Philo, the forerunner of the Neo-Platonists, even spoke of *the soul of the soul*. Lucretius has the same curious expression, to which corresponds the distinction of Roman writers in general between *animus* and the animal soul, *anima*. The earliest Christian writings occasionally distinguish body, soul, and spirit (*pneuma*). Such a threefold division was unfamiliar to the Jewish mind, which appears to have rested in a kind of dualism, and was removed even from the common Greek philosophical expression, *pneuma* being the word employed by Stoic dualists to describe the fine ethereal nature of the material soul. It is hard to say whether a thorough-going Trichotomy was meant by the Christian writers, or whether the soul was not merged in either of the extreme elements—the coarse material body, or (as commonly conceived) the finely attenuated but still material spirit. Till about the 4th c., the language of Trichotomy prevailed in the Christian writings, but thenceforth the doctrine became suspect, having been specially appropriated by certain heretical sects, and soul and spirit came to be identified in substance, and distinguished only in function. Aquinas, and, later, Calvin, pronounced in favour of the dualistic rendering, after which modern popular expression has been moulded, chiefly through the predominant influence of spiritualism since the time of Descartes. This gives prominence to the word soul over spirit, except in religious and purely metaphysical aspects. The successors of Descartes have followed him in calling the single soul at once both rational and sensitive; but in rejecting, almost without exception, his description of the lower animals as mere mechanical automata, they have ignored, without an attempt to explain, the real difficulty that he sought to get rid of, and that the Trichotomy sought to meet. The ancient doctrine has been revived in various shapes by Paracelsus, Van Helmont, the anatomist Willis, De Maistre, and others.

The Egyptian doctrine of the soul is one of the most important, as it is the most ancient, for this nation appears to have been the first to declare that the soul was immortal. The genesis of the soul itself, however, is not defined by the monuments, although the existence of a cosmic soul, from which the others proceeded, is mentioned by ancient authors. The following may be gathered from a comparison of the papyri and monuments with the traditions handed down by the classical writers:—The soul itself, once separated from the cosmic or mundane soul, was supposed to undergo numerous transmigrations, passing from one animated body to another till its cycle of existence was fulfilled. The soul was considered to be essentially distinct from the body, and only connected with it through the link of life. It was represented in the hieroglyphs by several signs, as a basket of fire, a heron, a hawk with a human face, and a ram. Its nature was divine, but after death it passed to the great judgment in the hall of the Two Truths, where it was tried before Osiris and the forty-two assessors or demons of the dead, whose verdict determined its future destiny. This

depended upon the sins it had perpetrated during life, and which more or less interfered with its transmigration through the necessary cycle of existence till its ultimate union with the deity, and reception into the Egyptian heaven. In the judgment, it was accused by the enemy or accuser; and after the judgment, it was either devoured or annihilated, passed to the region of the Egyptian hell, or to the place of the metempsychosis, from which it entered some body of man or animal on the point of entering into existence. The great desire of the dying, indeed, was, that his soul should pass off the earth, its detention here preventing its ascent to the moon or heaven. The souls of the wicked passed into the Egyptian Hades, which the sun was supposed to traverse during the hours of the night. There they were subjected to punishments of a corporeal rather than spiritual nature—burned in brasiers, plunged into streams, kept in utter darkness, and deprived of the presence of the Sun-god, uttering fearful howls and wails in the prisons within which they were confined. After the passing of the great judgment, the soul underwent a series of transformations and adventures in the future state. It was justified, as Osiris had been, against the accusations laid to its charge by evil spirits. It assumed the form of a hawk, heron, swallow, and of a snake with a human head—that of the cosmic soul. In the fields of the Aah-en-ru, or Ahlu, the Egyptian Elysium, it sowed and reaped the harvest of gigantic grain which grew in that happy plain. It ascended the *makhen*, or mystical bark, and rowed through the winding of the celestial Nile, passed the fiery caldron of the Hades, revisited the body, entered the boat of the Sun, and passed through different regions of the Egyptian hell, in which the damned were detained, arriving at last at the manifestation to light. To preserve the body, in order that the soul might revisit and probably reanimate it at a future period, not only was it embalmed with the greatest care, but amulets were attached to it which were supposed to have the power of retaining the vital warmth, and of protecting it from destruction or decay. The period after which the soul was supposed to enter again into a human body was 3000 years, during which it transmigrated through other orders of animated nature. The principal dogmas, indeed, of the soul amongst these people were its creation or emanation from the cosmic soul, its transmigrations, and its final reception into heaven, where it lived in the boat of the Sun, and traversed the liquid ether in company with that luminary. The Pythagorean and Platonic schools seem to have drawn extensively from Egyptian sources in regard to the nature and destiny of the soul. The Brahmanical and Buddhistic notions of the soul have also much in common with the Egyptian. See BUDDHISM, TRANSMIGRATION.—Herodot. ii. 23; Plutarch, *De Isid.* c. 29; Hermes, *Clavis;* Prichard, *Egypt. Mythol.;* Rheinisch, *Denkm. in Miramar* (Wien, 1865).

SOULOUQUE. See FAUSTINUS I.

SOULS, CURE OF (Lat. *cura animarum*, care of souls), the technical phrase by which the canon law describes the charge which is given to a pastor, no matter of what degree of dignity, over the spiritual concerns of a flock; and the words especially imply the right of administering the sacraments. In this sense, the phrase is used to mark an important distinction between two classes of benefices or church-livings—'benefices with,' and 'benefices without,' the cure of souls. Of the latter class are canonries, prebends, and the whole class known in the canon law as 'simple benefices.' Of the former are parochial cures, vicarial cures, and still more the higher charges of archbishop, bishop, &c.

SOULT, NICOLAS-JEAN DE DIEU, Duke of Dalmatia, and Marshal of France, the son of a notary, was born at Saint-Amens-la-Bastide, in the dep. of Tarn, March 29, 1769. In 1785, he enrolled himself as a private in the Royal Infantry regiment; and so distinguished himself by his steady obedience to discipline, indomitable *sang-froid*, and general intelligence, that in 1792 he became adjutant-major. His behaviour at Fleurus gained for him (October 11, 1794) the brevet of general of brigade. From 1794 to 1799, he was employed on the eastern frontier, and in the retreat after the defeat of Stockach (March 25, 1799), his able handling of the rear-guard alone prevented the annihilation of the French army. Appointed general of division (April 21, 1799), and put under Massena, whom he ably seconded in Switzerland and Italy, he was afterwards, on the warm recommendation of Massena, appointed by Napoleon to one of the four colonelships of the consular guards, and now became an ardent Napoleonist. This devotion, doubtless, was a great means of his obtaining the bâton of Marshal of France; but he most certainly justified his appointment by his brilliant achievements in the subsequent campaign against the Austrians, closed by the battle of Austerlitz, which he decided by piercing the Russian centre. He also did good service in the Prussian campaign; and took an important, though not a prominent part, in the Russian campaign of 1806—1807, after which he was appointed governor of Berlin, and created Duke of Dalmatia. S. was next placed at the head of the second corps in Spain, pursued the retreating British, attacked them at Coruña, and though repulsed, forced them to leave all their matériel behind. He then conquered Portugal, and exercised vice-regal authority over it, but the sudden arrival of Wellesley at Coimbra, and of Beresford at Chaves, made him retreat rapidly to Galicia. In September 1809, he became commander-in-chief in Spain, gained a brilliant victory at Ocana (18th November); and at the commencement of the following year, overran and subdued Andalusia, continuing to command in person the southern army. In attempting to succour Badajos, which he had captured and garrisoned (March 11), he was defeated by Beresford at Albuera (May 16, 1811). After the battle of Salamanca, and the advance of the British on Madrid, S. became thoroughly disgusted at the rejection of his admirable plans for transferring the theatre of war to Andalusia, and demanded and obtained his recall; but on the news of Vittoria (q. v.) reaching Napoleon, S., whom alone he considered capable of turning the tide of ill-fortune, was, in all haste, restored to the command-in-chief of the army of Spain. Now, however, it was not in Spain but in France that the contest had to be waged, and the advantage of numbers, discipline, and prestige were all on the enemy's side; nevertheless, by a system of military tactics which has been universally admired, he completely neutralised the consummate strategy of Wellington, and reduced the campaign, during the seven months it lasted, to a mere trial of strength, the defeats which he sustained at Orthez and Toulouse being due to the superiority of the British soldiers, not of their general. With his usual suppleness of character, he became an ardent royalist after the abdication of Napoleon; but on the return of the latter from Elba, he abandoned Louis XVIII., and became major-general of the imperial army. After Waterloo, he rallied the army at Laon; and on July 3d, at the council of war, coincided with Carnot as to the

uselessness of further resistance. To avoid the punishment due to his treachery, he published a memoir traducing Napoleon in the basest manner, and lauding the 'lawful princes' (i. e., the Bourbons); but in spite of this he was banished, and not recalled till May 1819; however, in the course of a few years more, he was restored to all his former honours, and took an active part in politics, and in the development of French industry. In 1838, he was sent as ambassador to England, and, as the great antagonist of Wellington, was received with the utmost enthusiasm. In 1845, he retired from active duty, was honoured with the appointment of 'Marshal-general of France' and retired to his residence of Soultberg, where he died, November 26, 1851. In the following year, a statue of him, in white marble, was placed in the galleries of Versailles. See S.'s *Mémoires*, which are in process of publication; also, Napier's *History of the Peninsular War;* Thiers's *Histoire de la Revolution et de l'Empire;* and Salle's *Vie Politique du Maréchal S.* (1834).

SOUND (Lat. *sonitus*) is the impression produced on the Ear (q. v.) by the vibrations of the elastic medium, such as air or water, in which it is plunged. That this is the case, is proved, *first*, by the fact, that a bell or tuning-fork *in vacuo* gives no sound when struck; *second*, by the fact, that mere currents, as such (winds, running water, &c.), do not produce the sensation of sound until they are frittered down into vibratory motions by obstacles.

The most untutored ear distinguishes at once between a mere *noise* and a *musical note*. It of course distinguishes a *loud* sound from a faint one. Moreover, it distinguishes musical notes from one another by their shrillness or gravity, or, as it is technically called, their *Pitch*. Again, as in the case of vowel-sounds sung to the *same* musical note, or as in the case of different instruments (flute and violin, for instance) playing the same note, it distinguishes something further—which is called the *Quality* of the note. It is on the pitch of notes that the Theory of Music (q. v.) is based, for the quality is only of importance in giving variety, as in orchestral music—or in giving richness of tone in a solo. The most perfect *music*, so far as theory goes, may be executed on the poorest instrument, but it gives little pleasure from the want of richness or quality. In the same way, a singer may possess faultless intonation, yet the performance, though *musically* perfect, may, from the harsh quality of the voice, be unpleasant. We intend, in the present article, to avoid everything connected with music, and have made these remarks to shew that there is something in the theory of sound more profound than is contemplated in the theory of music.

The questions we have now to discuss are:

1. What constitutes the difference between a mere noise and a musical note?
2. On what does the pitch of a note depend?
3. On what does its quality depend?

The answers to these queries are all contained in the following statement:

Every musical note consists in the repetition, at equal small intervals of time, of some definite noise; the pitch depends on the rate of repetition; and the quality upon the nature of the fundamental noise.

Rough experimental illustrations of the parts of this statement are easily given, more refined ones will be afterwards alluded to. If, for instance, the edge of a card be held to a revolving toothed-wheel, a definite noise is produced as each tooth bends the card and allows it to spring back. While the wheel revolves slowly, we can distinguish these successive noises; but when it is revolving so fast that they are no longer separately distinguishable, the character of the sound changes completely. It now becomes continuous, and, so far as the ear can detect, uniform, and thus becomes a musical note (with such an apparatus, not a pleasing one). As the wheel is made to revolve faster and faster, the pitch of the note rises, till it becomes a sort of shriek, and finally becomes inaudible. The *Sirène* (q. v.) gives another excellent illustration. In this case, the fundamental noise is produced by a puff of air escaping from an orifice; and we observe, just as before, that the greater the number of such puffs per second, after they have become so frequent as to be separately undistinguishable, the higher is the pitch of the musical note produced.

Now, if by machinery we arrange matters so that the sirène and the toothed-wheel give the number of puffs and the number of impacts on the card the same per second, the musical note produced by each has the same pitch. But the notes differ greatly in quality, the one being exceedingly soft and pleasant, the other harsh and grating. The pitch, therefore, depends on the number of noises per second, and the quality upon the nature of the fundamental noise. We shall find a complete theoretical proof of this later.

The general nature of the mechanical process by which sound is propagated in the air will be illustrated, and compared with other cases of wave-motion, in our article on WAVES. Meanwhile, it is only necessary for us to observe that, as the velocity of sound is ten times greater than that of wind in the most violent hurricane, it is not *air* itself which is transferred from place to place, but a *state of disturbance* (condensation or rarefaction) of the air. Each successive layer of air in the path of the sound suffers this disturbance in turn, and by virtue of its Elasticity (q. v.), passes it on to the next.

Newton was the first who attempted to deduce from mechanical principles the velocity of sound, but only for the particular case in which each particle of air, in the path of the sound, is supposed to move backwards and forwards according to the same law as the bob of a Pendulum (q. v). He showed that this species of motion is consistent with the elastic properties of air, as given by Boyle's or Mariotte's Law (q. v.), viz., that the pressure of air is proportional to its density. The velocity of sound in this case is of course to be found from the time which elapses between the commencement of the motion of any one particle of air, and that of another at a given distance from it, in the direction in which the sound is moving. The numerical result deduced by Newton with the then received experimental data for the compressibility of air, was 979 feet per second. This investigation was very defective, applying, in fact, solely to the special case of a pure musical note, continually propagated without lateral divergence; yet the solution obtained by Lagrange from a complete analysis of the question, gave precisely the same mathematical result.

But, by direct measurements, carefully made, by observing at night the interval which elapses between the flash and the report of a cannon at a known distance, the velocity of sound has been found to be considerably greater—in fact, about 1090 feet per second, at the temperature of freezing water.

Newton seeks for the cause of this discrepancy between theory and observation in the idea that the size of the particles of air is finite compared with their mutual distance; and that sound is instantaneously propagated through the particles themselves. Thus, supposing the particles to have a diameter $\frac{1}{9}$th of the distance between them, we must add $\frac{1}{9}$th to the space travelled by sound in a second, i. e., to the velocity—which will thus be

brought up to (1 + ⅑) 979 feet = 1088 feet nearly, which is a very close approximation to the actual value given above.

This is not one of Newton's happiest conjectures—for, independent of the fact that such an assumption would limit definitely the amount of compression which air could undergo, and, besides, is quite inconsistent with the truth of Boyle's law for even moderate pressures, it would result from it, that sound should travel slower in rarefied, and quicker in condensed air. Now, experiment shews that the velocity of sound is unaffected by the height of the barometer; and, indeed, it is easy to see that this ought to be the case. For in condensed air the pressures are increased proportionally to the increase of condensation, and the mass of a given bulk of air is increased in the same proportion. Hence, in a sound-wave in condensed air, the forces and the masses are increased proportionally, and thus the rate of motion is unaltered. But the temperature of the air *has* an effect on sound, since we know that the elastic force is increased by heat, even when the density is not diminished; and therefore the velocity of sound increases with the temperature at the rate of about 4½ feet per Fahrenheit degree, as is found by experiment.

Newton's explanation of the discrepancy between theory and experiment being thus set aside, various suggestions were made to account for it; some, among whom was Euler, imagining that the mathematical methods employed, being only approximate, involved a serious error.

The explanation was finally given by Laplace, and is simple and satisfactory. When air is *suddenly* compressed (as it is by the passage of a sound-wave), it is heated; when suddenly rarefied, it is cooled, and this effect is large enough to introduce a serious modification into the mathematical investigations. The effect is in either case to *increase* the forces at work—for, when compressed, and consequently heated, the pressure is greater than that due to the mere compression—and, when rarefied, and consequently cooled, the pressure is diminished by more than the amount due to the mere rarefaction. When this source of error is removed, the mathematical investigation gives a result as nearly agreeing with that of observation as is consistent with the unavoidable errors of all experimental data. It is to be observed that, in noticing this investigation, nothing has been said as to the pitch or quality of the sound, for these have nothing to do with the velocity. It must, however, be remarked here that, in the mathematical investigation, the compressions and rarefactions are assumed to be very small; i. e., the sound is supposed to be of moderate intensity. It does not follow, therefore, that very violent sounds have the same velocity as moderate ones, and many curious observations made during thunder-storms seem to shew that such violent sounds are propagated with a greatly increased velocity. (See a paper by Earnshaw in the *Phil. Mag.* for 1861.) It is recorded that in one of Parry's arctic voyages, during gun-practice, the officer's command 'Fire' was heard at great distances across the ice *after* the report of the gun.

Since sound consists in a wave-propagation, we should expect to find it exhibit all the ordinary phenomena of Waves (q. v.). Thus, for instance, it is *reflected* (see ECHO) according to the same law as light. It is *refracted* in passing from one medium to another of different density or elasticity. This has been proved by concentrating in a focus the feeble sound of the ticking of a watch, and rendering it audible at a considerable distance, by means of a lens of collodion films filled with carbonic acid gas.

Sounds *interfere* to reinforce each other, or to produce silence; just as the crest of one wave in water may be superposed on the crest of another, or may apparently destroy all motion by filling up its trough. The simplest mode of shewing this is to hold near the ear a vibrating tuning-fork and turn it slowly round its axis. In some positions, the sounds from the two branches reinforce, in others they weaken, each other. But if, while the sound is almost inaudible, an obstacle be interposed between the ear and one of the branches, the sound is heard distinctly. Beats, which will shortly be alluded to, form another excellent instance.

To give an idea of the diminution of loudness or intensity of a sound at a distance from its source, let us consider a series of spherical waves diverging from a point. The *length* of a wave, as we know from the theory, does not alter as it proceeds. (Indeed, as we shall presently see, the pitch of a note depends on the length of the wave; and we know that the pitch is not altered by distance.) Hence, if we consider any one spherical wave, it will increase in radius with the velocity of sound, but its thickness will remain unaltered. The same disturbance is thus constantly transferred to masses of air greater and greater in proportion to the *surface* of the spherical wave, and therefore the amount in a given bulk (say a cubic inch) of air will be inversely proportional to this surface. But the surfaces of Spheres (q. v.) are as the squares of their radii—hence the disturbance in a given mass of air, i. e., the loudness of the sound, is inversely as the square of the distance from the source. This follows at once from the law of conservation of energy (see FORCE), if we neglect the portion which is constantly being frittered down into heat by fluid friction. All sounds, even in the open air, much more rapidly in rooms, are extinguished ultimately by conversion into an equivalent of heat. Hence sounds really diminish in intensity at a greater rate than that of the inverse square of the distance; though there are cases on record in which sounds have been heard at distances of nearly 200 miles. But if, as in speaking-tubes and speaking-trumpets, sound be prevented from diverging in spherical waves, the intensity is diminished only by fluid friction, and thus the sound is audible at a much greater distance, but of course it is confined mainly to a particular direction.

As already remarked, the purest sounds are those given by a tuning-fork, which (by the laws of the vibration of elastic solids) vibrates according to the same law as a pendulum, and communicates exactly the same mode of vibration to the air. If two precisely similar tuning-forks be vibrating with equal energy beside each other, we may have either a sound of double the intensity, or anything less, to perfect silence, according to their relative *phases.* If the branches of both be at their greatest elongations simultaneously, we have a doubled intensity—if one be at its widest, and the other at its narrowest, simultaneously, we have silence, for the condensation produced by one is exactly annihilated by the rarefaction produced by the other, and *vice versâ.* But if the branches of one be loaded with a little wax, so as to make its oscillations slightly slower, it will gradually fall behind the other in its motion, and we shall have in succession every grade of intensity from the double of either sound to silence. The effect will be a periodic swelling and dying away of the sound, and this period will be longer the more nearly the two forks vibrate in the same time. This phenomenon is called a *beat,* and we see at once, from what precedes, that it affords an admirable criterion of a perfect *unison,* that is, of two notes whose pitch is the same. It is easy to see, by

the same kind of reasoning, that if two forks have their times of vibration nearly as 1 : 2, 2 : 3, &c.—i. e., any simple numerical ratio—there will be greater intervals between the beats according as the exact ratio is more nearly arrived at.

We must now consider, so far as can be done by elementary reasoning, the various simple modes of vibration of a stretched string, such as the cord of a violin. Holding one end of a rope in the hand, the other being fixed to a wall, it is easy (after a little practice) to throw it into any of the following forms,

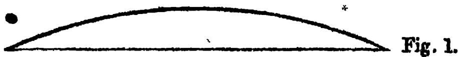


Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.

the whole preserving its shape, but rotating round the horizontal line. If the tension of the rope be the same in all these cases, it is easy to see that the times of rotation must be inversely as the number of equal segments into which the rope is divided; for the various parts will obviously have the same form; and the masses and distances from the axis of rotation being proportional to their lengths, the Centrifugal Forces (q. v.) will be as the squares of the lengths, and inversely as the squares of the times of rotation. But these centrifugal forces are balanced by the components of the tensions at the extremities, in directions perpendicular to the horizontal line; which are, by hypothesis, the same for all the figures. Hence the time of rotation is directly as the length of each segment. Now (see PENDULUM) any such rotation is equivalent to two mutually perpendicular and independent pendulum vibrations of the cord from side to side of the horizontal line. Thus, a violin-string may vibrate, according to the pendulum law, in one plane, either as a *whole* (fig. 1), as *two halves* (fig. 2), as *three thirds* (fig. 3), &c.; and the times of vibration are respectively as 1, $\frac{1}{2}$, $\frac{1}{3}$, ... Nay, more, any two or more of these may coexist in the same string, and thus, by different modes of bowing, we may obtain very different combinations of simple sounds: a *simple sound* being defined as that produced by a single pendulum motion, such as that of a tuning-fork, or one of the uncomplicated modes of vibration of a string.

The various simple sounds which can be obtained from a string are called *Harmonics* of the fundamental note; the latter being the sound given by the string when vibrating as a whole (fig. 1). For each vibration of the fundamental note, the harmonics have two, three, four, &c. Of these, the first is the octave of the fundamental note; the second the twelfth, or the fifth of the octave; the third the double octave; and so on. Thus, if we have a string whose fundamental note is C, the series of simple sounds it is capable of yielding is:

$$C, C_1, G_1, C_2, E_2, G_2 (B\flat_2), C_3, D_3, E_3, \&c.$$

Of those written, all belong to the ordinary musical scale except the seventh, which is too flat to be used in music. This slight remark shews us at once how purely artificial is the theory of music, founded as it is, not upon a physical, but on a sensuous basis.

To produce any one of these harmonics with ease from a violin-string, we have only to touch it lightly at $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. of its length from either end and bow as usual. This process is often employed by musicians, and gives a very curious and pleasing effect with the violoncello or the double-bass. The effect of the finger is to reduce to rest the point of the string touched; and thus to make it a point of no vibration, or, as it is technically called, a *Node*.

In the case of a pianoforte wire, a blow is given near one end, producing a displacement which runs back and forward along the wire in the time in which the wire would vibrate as a whole. The successive impacts of this wave on the ends of the wire (which are screwed to the sounding-board), are the principal cause of the sound. But more of this case later.

The theory of other musical instruments is quite as simple. Thus, in a flute, or unstopped organ-pipe, the sound is produced by a current of air passing across an orifice at the closed end. This produces a wave which runs along the tube, is reflected at the open end, runs back, and partially intercepts the stream of air for an instant, and so on. Thus the stream of air is intercepted at regular intervals of time, and we have the same result as in the Sirène (q. v.). In this case, there is *one* node only, viz., at the middle of the pipe. If we blow more sharply, we create two nodes, each distant from an end by $\frac{1}{4}$ of the length of the tube. The interruptions are now twice as frequent, and we have the first harmonic of the fundamental note. And so on, the series of harmonics being the same as for a string. We may easily pass from this to the case of an organ-pipe closed at the upper end. For if, while the open pipe is sounding its fundamental note, a diaphragm be placed at the node, it will not interfere with the motion, *since the air is at rest at a node.* That is, the fundamental note of a closed pipe is the same as that of an open pipe of double the length. By examining the other cases in the same way, we find that the numbers of vibrations in the various notes of a closed pipe are in the proportions 1 : 3 : 5 : 7 : &c., the even harmonics being wholly absent.

There is another kind of organ-pipe, called a reed pipe, in which a stream of air sets a little spring in vibration so as to open and close, alternately, an opening in the pipe. If the spring naturally vibrates in the time corresponding to any harmonic of the pipe, that note comes out with singular distinctness from the combination—just as the sound of a tuning-fork is strongly reinforced by holding it over the mouth-hole of a flute which is fingered for the note of the fork. If the spring and the tube have no vibration in common, the noise produced is intolerably discordant. The Oboe, Bassoon, and Clarionet are mere modifications of the reed-pipe; and so are Horns in general, but in them the reed is supplied by the lip of the performer. Thus, a Cornet, a Trumpet, or a French Horn, gives precisely the same series of harmonics as an open pipe.

The statements just made as to the position of the nodes in a vibrating column of air are not strictly accurate, for the note is always found to be somewhat *lower* than that which is calculated from the length of the tube and the velocity of sound. Hopkins shewed experimentally that the distance between two nodes is always *greater* than twice the distance from the open end to the nearest node. The mathematical difficulties involved

in a complete investigation of the problem were first overcome by Helmholtz in 1859, in an admirable paper published in *Crelle's Journal*. The results are found to be in satisfactory accordance with those previously derived from experiment.

We have now to consider the subject of the quality of musical sounds; and one of its most important branches, what constitutes the distinction between the various vowel-sounds. It had long been recognised that the only possible cause of this distinction between sounds *musically identical* must lie in the nature of the fundamental noise, or, to express it differently, the nature of the periodic motion of each particle of air. But it appears that Helmholtz was the first to enter upon a complete examination of the point, both mathematically and experimentally, and the results he has arrived at form by no means the least remarkable of the contents of his excellent work, *Die Lehre von den Tonempfindungen*, recently published.

It was established by Fourier, that any periodic expression whatever may be resolved into the sum of a number of simple harmonic terms, whose periods are, respectively, that of the original expression, its half, its third part, &c. Hence any periodic motion of air (i. e., any musical sound) may be resolved into a series of simple pendulum vibrations (i. e., pure musical sounds, such as those of tuning-forks), the first vibrating once in the given period, the second twice, and so on. These notes are, as we have seen, the several harmonics of the lowest. Hence the quality of a musical sound depends upon the number and loudness of the harmonics by which it is accompanied.

Two experimental methods were employed by Helmholtz, one analytical, the other synthetical. In the first he made use of resonance-cavities fitted to the ear, and giving scarcely any indication of external sounds until one is produced which exactly corresponds in pitch with the note which the cavity itself would yield. With a series of such cavities, tuned to the several harmonics of some definite note, the note was examined when played on various instruments, and when sung to different vowel-sounds. It was thus ascertained which harmonics were in each case present, and to what extent, producing the particular quality of the sound analysed. The second method was founded on the fact, already noticed, that a tuning-fork gives an almost pure musical sound (i. e., free from harmonics). A series of tuning-forks, giving a note and its harmonics, were so arranged as to be kept constantly in vibration by an electro-magnetic apparatus. Opposite to each was fixed a resonance-cavity exactly tuned to it, and capable of being opened more or less at pleasure. When all the cavities were shut, the sound was scarcely audible; so that by opening them in various ways, any combination of harmonics might be made to accompany the fundamental note. These combinations were varied by trial, until the quality of the resultant sound was brought to represent as nearly as possible that of some vowel. The results of this second series of experiments coincided with those of the first. It appears from these investigations that the German U is the quality of a simple sound, though it is improved by adding faintly the two lowest harmonics; that O depends mainly on the presence of the third harmonic; and so on with the other sounds. It also appears, and it is well known by experience, that different vowel-sounds, to be sung with accuracy, require to be sung to different notes, the proper note being that for which the cavity of the mouth is adapted for the production of the accompanying harmonics which determine the quality of the particular vowel.

In strings and pipes, as we have seen, the higher notes are strictly harmonics of the fundamental note, and therefore the sounds of instruments which depend on these simple elements are peculiarly adapted for music. On the other hand, when, as in masses of metal, &c., the higher notes are not harmonics of the fundamental note, the mixed sound is always more or less jarring and discordant. Such is the case with bells, trumpets, cymbals, triangles, &c.; and, in fact, these sounds are commonly characterised as 'metallic.' To produce from such instruments a sound as pleasing as possible, they must be so struck that as few as possible of the higher notes are produced, and these as feebly as possible. Thus, for instance, to get the most pleasing sound from a pianoforte-wire, it should not be struck at the middle, as in such a case the first, third, fifth, &c. harmonics of the fundamental note will be wanting. If, however, it be struck at about ⅐th of its length from one end, the harmonics produced will be mainly the first five; and these all belong to the chord of the fundamental note, so that the sound produced is rich and full.

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